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INDEX TO CONTENTS

The Determination of Substitute in Rubber..... 107
The Load Curve of Rubber..... 109
A Résumé of Recent Patents..... 110
A New Departure in Education..... 111
Fresh Air and Production..... 114
McCarty Sales Manager for Standard..... 115
Fisk Promotes Horner..... 115
Overland Has Experienced Head..... 115
Ideal Increases Output..... 115
News of the Rubber Association..... 116
Brunswick Issues New Stock..... 116
New Rubber Firm Organized..... 117
New Cincinnati Company..... 117
U. S. Compression Builds..... 117
L. & M. Changes Firm Name..... 117
Akron's Many-Sided Growth..... 118
Unauthorized Strike Impedes Progress..... 118
Wage Increase in Rubber Factories..... 118
Akron Stock Prices..... 118

MARKETS:

Manufactured Rubber Goods..... 119
Cottons Yarns and Fabrics..... 119
Chemicals and Compounding Materials..... 120
Crude Rubber..... 121
Scrap Rubber..... 121
American Rubber Patents..... 122

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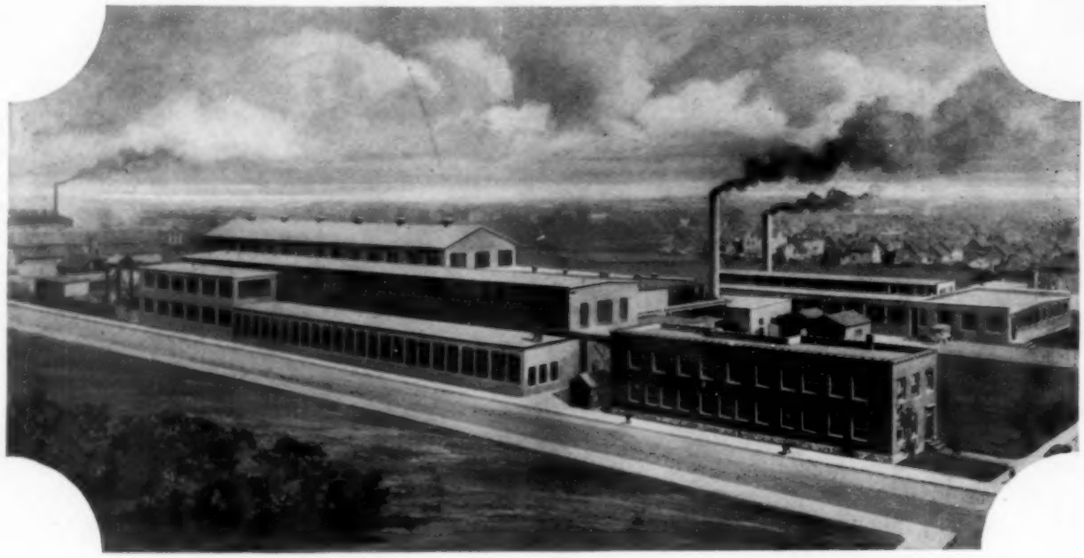

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The Determination of Substitute in Rubber*

By P. Dekker

The accurate determination of substitute in rubber articles is somewhat difficult. The method usually followed for an approximate test is as follows:

"Part of the residue of the acetone extraction is heated for four hours in a flask with reflux condenser with 50 cc. alcoholic potash solution, 0.5N. It is then filtered and the residue washed a few times with boiling alcohol and then with boiling water. Filtrate and washing liquid are evaporated to 15 cc., brought into a separating funnel, and after acidifying with hydrochloric acid, shaken with ether. The layer of ether is brought into a weighed flask, the ether is evaporated, the flask is dried at 100°, and the increase of weight of the flask indicates the percentage of factis acids."

The determination takes place in the material previously extracted with acetone for reason that rubber resins are also partly able to be saponified.[1] However, the substitute also dissolves partly in acetone, and this part varies for the different kinds of substitutes. The percentage found in the alcoholic potash extract is therefore too low for two reasons:

1. One part of the substitute is extracted with the acetone.
2. With the determination of the percentage of "factis acids" the real substitute is not actually expressed.

The second error is not to be avoided but can never be considerable. To correct the first one as much as possible it has been proposed to determine the other substances in the acetone extract, and to conclude therefrom what percentage of substitute is present in the acetone extract. The percentage of factis acids found as alcoholic potash extract increased by the percentage of substitute in the acetone extract, yields then the total substitute.

Although this method is in general use,[2] a doubt arose when repeatedly using it as to the accuracy of its results. For that reason an investigation was decided upon and tests were carried out on a number of rubber mixings with substitute of which the composition was entirely known.

The composition of the samples tested was as follows:

TABLE I.

COMPOSITION OF THE MIXINGS.

No. 1.—Rubber 60%, chalk 12%, iron oxide 12%, magnesium oxide 1%, brown substitute 10%, sulphur 5%.
No. 2.—As No. 1, but instead of brown, white substitute.
No. 3.—Rubber 60%, chalk 16%, iron oxide 15%, magnesium oxide 1%, sulphur 5%, brown substitute 3%.
No. 4.—As No. 3, but instead of brown, white substitute.
No. 5.—Rubber 60%, chalk 18%, iron oxide 15%, magnesium oxide 1%, sulphur 5%, brown factis 1%.
No. 6.—As No. 5, but instead of brown, white substitute.
No. 7.—Rubber 82.5%, sulphur 7.5%, brown substitute 10%.
No. 8.— " 82.5%, " 7.5%, white " 10%.
No. 9.— " 89.5%, " 7.5%, brown " 3%.
No. 10.— " 89.5%, " 7.5%, white " 3%.
No. 11.— " 91.5%, " 7.5%, brown " 1%.
No. 12.— " 91.5%, " 7.5%, white " 1%.
No. 13.— " 92.5%, " 7.5%,
No. 14.—Rubber 47.5%, zinc oxide 20%, sulphur 7.5%, brown substitute 25%.

Numbers of samples in Tables III, and following are referring to the numbers of these compositions.

The samples Nos. 1 to 6 were vulcanized for 40 minutes, Nos. 7 to 14 for 1½ hours, at 3½ atm. gauge pressure (148°.2 C.).

The rubber used was Hevea crepe with an acetone extract of 3 per cent. As vulcanizing does not appreciably change the acetone extract, the percentage of substitute could be calculated in the acetone extract of the vulcanized samples, the percentage of free sulphur being known.

As to the samples of substitute used in the compounds, the following figures were found:

TABLE II.

COMPOSITION OF THE SUBSTITUTE USED.

	Brown	White
Acetone extract	38.0%	16.2%
Total sulphur	11.0%	7.0%
Sulphur in acetone extract	1.8%	1.2%
Ash	0.2%	4.7%

2.—*Determination of Substitute in Vulcanized Rubber*

After previous extraction with acetone the alcoholic potash extract was determined in the samples of Table I. For this purpose two grammes of the acetone extracted material was used. The quantity of substitute in the acetone extract was calculated. The results can be seen from Table III.

TABLE III.

DETERMINATION OF SUBSTITUTE IN VULCANIZED RUBBER.

No.	Substitute added in %	Acetone Extract.	Free Sulphur.	Substitute in Acetone Extract, A.	Alcoholic Potash Extract B.	Total Substitute in % A+B.
1	10, brown ..	7.6	2.0	3.8	0.6	4.4
2	10, white ...	8.2	3.9	2.5	1.2	3.7
3	3, brown ..	4.3	1.8	0.7	0.3	1.0
4	3, white ...	5.4	2.9	0.7	0.3	1.0
5	1, brown ..	3.8	1.9	0.1	0.3	0.3
6	1, white ...	4.0	2.3	0.0	0.1	0.1
7	10, brown ..	10.9	4.2	4.1(4.0)[1]	0.7(2.1)[1][2]	4.8 (6.1)[1]
8	10, white ...	10.6	5.2	2.8(2.6)	2.1(0.9)[2]	4.9 (3.5)
9	3, brown ..	8.4	4.4	1.1(0.9)	0.2(1.1)	1.3 (2.0)
10	3, white ...	9.1	5.2	1.0(0.8)	0.5(0.3)	1.5 (1.1)
11	1, brown ..	8.1	4.7	0.4(0.2)	0.2(0.4)	0.6 (0.6)
12	1, white ...	8.4	5.4	0.1(0.1)	0.2(0.3)	0.3 (0.4)
13	without any	7.8	4.9	0.0(0.0)	0.0(0.4)	0.0 (0.4)
14	25, brown ..	11.8	1.5	9.2	14.4	23.6

The numbers of the samples are the same as those in Table I.
[1]The figures between brackets were found in the mixes 7 to 13 after having been vulcanized for 3 hours.
[2]Sample very finely cut.

From the figures in the third column it follows that the part of the substitute originally soluble in acetone retains this property after vulcanization. This is also the case if the samples are further vulcanized, which is made evident from the figures obtained from Nos. 7 to 13 having been treated for three hours (figures between brackets).

The last column proves the important fact that in many cases the determination of substitute yields figures which, according to the method followed up to the present, are considerably too low.

No better results were obtained with stronger alcoholic potash solution, viz., 1N instead of 0.5N, caused a sample with 10 per cent substitute to yield only 0.8 per cent alcoholic potash

*Communication of the Netherlands Government Rubber Institute at Delft.

[1] Communications of the Netherland Government Institute Part II. (1917), p. 49.

[2] W. A. Caspari, India Rubber Laboratory Practice (London, 1914), p. 123; F. W. Hinrichsen and K. Memmler, Der Kautschuk und seine Prüfung (Leipzig, 1910), p. 129.

solution extract. A small improvement was noted on very finely cutting the samples, but even then the results were insufficient (vide note 2 of Table III.).

The too low results are probably to be ascribed to the fact that the alcoholic potash did not penetrate far enough into the rubber. In view of this possibility it was tried whether previous swelling in benzene would improve matters. Thus two grammes of acetone extracted rubber was covered with 10 cc. benzene and left over for one night, 40 cc. alcoholic potash, 0.5N, was added, and boiled for four hours on the water bath with a reflux condenser. The filtrate and washing liquid were evaporated to 5 cc., by which alcohol and benzene were removed. The results obtained were higher than without previous swelling in benzene. After this it was considered what quantity of benzene and what time of swelling were required to find the exact figure for the substitute. The results are to be seen from Table IV., the figures in the third and fourth columns being taken from Table III.:

TABLE IV.

DETERMINATION OF THE ALCOHOLIC POTASH EXTRACT AFTER PREVIOUS SWELLING IN BENZENE.

No.	Added Substitute.	Substitute in Acetone Extract.	Extract in alcoholic potash solution according to method. Old Method.	A.	B.	C.	D.	E.
1	10%, brown	3.8%	0.6%	4.1%	5.8%	6.1%	3.3%	5.4%
2	10%, white	2.5%	1.2%	3.8%	6.6%	7.0%	3.2%	5.1%
3	3%, brown	0.7%	0.3%	1.3%	2.4%	2.3%	1.3%	2.4%
4	3%, white	0.7%	0.3%	1.8%	2.6%	2.4%	1.2%	2.0%
5	1%, brown	0.1%	0.3%	0.9%	1.2%	1.1%	0.7%	1.3%
6	1%, white	0.0%	0.1%	0.9%	1.1%	1.0%	0.2%	0.9%
7	10%, brown	4.1%	0.7%	4.5%	5.0%	3.2%	2.7%	4.2%
8	10%, white	2.8%	2.1%	5.8%	5.6%	3.8%	2.8%	4.6%
9	3%, brown	1.1%	0.2%	1.7%	2.0%	1.2%	0.8%	1.1%
10	3%, white	1.0%	0.5%	1.8%	2.2%	1.2%	0.9%	1.7%
11	1%, brown	0.4%	0.2%	1.1%	0.9%	0.4%	0.8%	0.5%
12	1%, white	0.1%	0.2%	0.8%	0.9%	0.7%	0.3%	0.5%
13	without	0.0%	0.0%	0.2%	0.5%	0.1%	0.1%	0.1%

Method.	Rubber.	Benzene.	Standing.	Filtrate Evaporated to
A	2 gr.	20 cc.	1 night	20 cc.
B	2 gr.	20 cc.	1 night	5 cc.
C	2 gr.	15 cc.	1 night	5 cc.
D	2 gr.	10 cc.	1 night	5 cc.
E	2 gr.	20 cc.	3 hours	5 cc.

This proves that swelling in benzene gives satisfactory results, but that one has to pay attention to the following:

1. Filtrate and washing liquid must be evaporated as far as possible. The reason for this has to be looked for in the fact that otherwise benzene is not sufficiently expelled and that therefore extraction with ether by shaking is not complete (compare results under A and B).
2. Benzene must be present in excess, giving too low results when this is not the case (compare under D); 1 to 6 contain mineral fillers and could suffice with 15 cc. benzene, 7 to 13, which do not contain any mineral fillers, require at least 20 cc. benzene (compare results under B and C).
3. The time of swelling is also of some influence. It appeared to be desirable to let the rubber stand over one night with benzene (compare results under E).

3.—Determination of Substitute in Unvulcanized Rubber Mixings

The above results all relate to vulcanized rubber. An investigation was then undertaken to find out whether unvulcanized mixtures on being treated with alcoholic potash solution would also yield too low results. The figures obtained are given in Table V.:

TABLE V.

DETERMINATION OF SUBSTITUTE IN UNVULCANIZED RUBBER MIXINGS.

No.	Added Substitute.	Acetone Extract.	Free Sulphur.	Substitute in Acetone Extract.	Extract in Alcoholic Potash Solution.	Total Substitute determined According to Old Method.
1	10%, brown	10.5%	5.1%	3.8%	1.9%	5.7%
2	10%, white	9.5%	5.2%	2.7%	1.4%	4.1%
3	3%, brown	7.6%	5.0%	0.8%	0.4%	1.2%
4	3%, white	7.0%	5.0%	0.2%	0.2%	0.4%
5	1%, brown	7.1%	4.9%	0.3%	0.0%	0.3%
6	1%, white	7.0%	5.0%	0.2%	0.0%	0.2%

This proves that in unvulcanized rubber mixings also too low a percentage is found with the usual method. After previous swelling in benzene the results also improve. Thus 2 grammes of the material previously extracted with acetone are allowed to remain for one night with 20 cc. benzene. It is then boiled for 4 hours with 40 cc. alcoholic potash solution, 0.5N. Filtrate and washing liquids are then evaporated to 5 cc. The results are to be seen in Table VI.:

TABLE VI.

THE DETERMINATION OF SUBSTITUTE IN UNVULCANIZED RUBBER MIXINGS, AFTER PREVIOUS SWELLING IN BENZENE.

No.	Added Substitute.	Acetone Extract.	Free Sulphur.	Substitute Extract in Acetone Extract.	Alcoholic Potash Solution.	Total Substitute (Determined.)
1	10%, brown	10.5%	5.1%	3.8%	5.9%	9.7%
2	10%, white	9.5%	5.2%	2.7%	7.2%	9.9%
3	3%, brown	7.6%	5.0%	0.8%	2.4%	3.2%
4	3%, white	7.0%	5.0%	0.2%	2.8%	3.0%
5	1%, brown	7.1%	4.9%	0.3%	1.4%	1.7%
6	1%, white	7.0%	5.0%	0.2%	1.5%	1.7%

The results as above show that for unvulcanized rubber mixings an added quantity of 20 c.M of benzene is sufficient.

It may thus be concluded that the existing method for determining factis acids should be altered. The method used was also applied to a number of technical samples, received for analysing. The results are compiled in Table VII., from which one will see that this method yields really higher results:

TABLE VII.

COMPARATIVE TESTING OF THE DETERMINATION OF THE ALCOHOLIC POTASH EXTRACT ACCORDING TO THE OLD AND THE ALTERED METHOD.

Unvulcanized Rubber Mixings. No. of Sample (Institute.)	Old Method.	Altered Method.	Vulcanized Rubber Mixings. No. of Sample (Institute.)	Old Method.	Altered Method.
693	0.1%	0.3%	712	2.2%	4.7%
694	0.7%	0.8%	713	23.9%	28.3%
695	0.7%	1.1%	714	1.0%	5.0%
696	0.1%	0.4%	728	0.8%	2.3%
701	0.0%	0.0%	730	0.3%	0.5%
702	0.0%	0.0%	733	0.0%	0.4%
703	0.1%	0.3%	734	0.5%	1.9%
705	0.0%	0.2%	735	1.9%	4.3%
706	0.0%	0.3%	736	0.0%	1.3%
724	14.7%	21.3%	740	0.2%	0.6%
725	0.3%	0.5%	742	0.3%	0.8%
749	0.2%	0.4%	743	0.2%	0.7%
750	1.2%	8.8%	725	0.1%	0.3%
751	0.1%	0.6%	753	0.2%	1.0%

The *modus operandi* of the altered method is as follows:

Two grammes of acetone extracted rubber is covered with 20 cc. benzene and left for one night; 40 cc. alcoholic potash solution, 0.5N, is added and the liquid is boiled for about 4 hours with a reflux condenser on a water bath. It is then filtered and the residue washed with boiling alcohol and then with boiling water. Filtrate and washing liquids are evaporated nearly to dryness (3 to 5 cc.), rinsed into a separating funnel, and after acidifying with hydrochloric acid, extracted with ether by repeated shaking. The layer of ether is brought into a weighed flask, the ether is evaporated and the flask dried at 100° C.

4.—The Determination of Substitute in the Presence of Asphalt

In order to study in how far the presence of asphalt is of any influence on the determination of substitute, some rubber samples of known composition (see Table VIII.) were vulcanized and tested.

TABLE VIII.

COMPOSITIONS WITH ASPHALT.

No.	Rubber.	Zinc Oxide	Sulphur.	Substitute.	Asphalt.
1	47.5%	20%	7.5%	—	25.0%
2	47.5%	20%	7.5%	12.5%	12.5%
3	74.5%	—	7.0%	—	18.5%
4	74.4%	—	7.0%	9.3%	9.3%

TABLE IX.

DETERMINATION OF SUBSTITUTE IN RUBBER MIXINGS WITH ASPHALT.

No.	Acetone Extract.	Free Sulphur.	Alcoholic Potash Extract.
1	14.6%	0.2%	0.6%
2	13.0%	0.4%	3.9%
3	11.1%	1.8%	1.9%
4	11.3%	1.7%	2.0%

The substitute in the acetone extract cannot be computed as a large part of the asphalt is also soluble in acetone.

It can be seen from the figures that asphalt also gives an extract with alcoholic potash solution. The difference between No. 1 and No. 3 must be explained by the fact that to No. 1 natural asphalt and to No. 3 coal asphalt was added. Notwithstanding the presence of asphalt the alcoholic potash extract is still far too low with Nos. 2 and 4. Swelling with benzene is therefore also necessary with mixtures as the above.

However, it is to be expected that if rubber mixtures with

asphalt swell in benzene, a part of the asphalt goes into solution. The bulk of this will not be saponificable and should be removable by shaking with petrol ether. In this way Nos. 3 and 4 were more closely tested. After swelling in benzene and heating with alcoholic potash solution, filtrate and washing liquid were evaporated to about half its volume and then shaken with petroleum ether. After shaking, the liquid was further evaporated to 5 cc. and after acidifying, extracted with ether. The results are laid down in Table X.:

TABLE X.

DETERMINATION OF THE ALCOLHOLIC POTASH EXTRACT AFTER SWELLING IN BENZENE.

No.	Added Substitute	Added Asphalt.	Alcoh. Potash Extract (without shaking with Petroleum Ether).	Petroleum Ether Extract.	Alcoh. Potash Extract (after shaking with Petroleum Ether).
3	0.0%	18.6%	5.6%	3.3%	2.3%
4	9.3%	9.3%	8.0%	1.7%	6.3%

As is to be expected a great deal of the asphalt is brought into solution through the swelling with benzene. From these figures it is also shown that on shaking with petroleum ether only part of the asphalt is removed. From the foregoing it is obvious that the determination of substitute is not feasible in compounds of rubber which contain asphalt.

5.—Oxidation of the Extracted Rubber in Connection with the Determination of the Substitutes

Some observations were made in close connection with the above determinations of substitute which will be dealt with here. The acetone extracted rubber kept in stoppered bottles appeared to be considerably altered after a few weeks. Without previous swelling in benzene the following results were found for the alcoholic potash extract:

TABLE XI.

INFLUENCE OF STORING ON THE EXTRACTION WITH ALCHOLIC POTASH SOLUTION.

No.	Vulcanized Rubber Alcoholic Potash Extract Directly Determined.	Vulcanized Rubber Alcoholic Potash Extract After Six Weeks.	Unvulcanized Rubber. Alcoholic Potash Extract Directly Determined.	Unvulcanized Rubber. Alcoholic Potash Extract After Six Weeks.
1	0.6%	14.5%	1.9%	1.2%
2	1.2%	15.0%	1.4%	3.4%
3	0.3%	8.0%	0.4%	0.6%
4	0.3%	12.3%	0.2%	0.6%
5	0.3%	11.3%	0.0%	0.7%
6	0.1%	9.1%	0.0%	0.7%

It is remarkable that only the vulcanized rubber is considerably changed. The change is probably to be ascribed to oxidation of the rubber. During a previous investigation on the non-saponificability of resins it had already transpired that the oxidation products of rubber are soluble in acetone and saponificable for the main part.

It had then to be observed whether the change could be ascribed to the mineral compounding ingredients. For this purpose the samples 7 to 13 not containing any were taken. The acetone extracted samples were again extracted with acetone after six weeks and then treated with alcoholic potash solution. The results are to be seen below:

TABLE XII.

RESULTS OF SAMPLES EXTRACTED WITH ACETONE AFTER KEEPING FOR SIX WEEKS.

No.	Acetone Extract. 1st Time.	Acetone Extract. 2nd Time.	Sulphur in 2nd Acetone Extract.	Alcoholic Potash Extract After 2nd Extraction with Acetone.
7	10.9%	9.0%	0.4%	13.3%
8	10.6%	7.0%	0.2%	16.4%
9	8.4%	10.9%	0.4%	9.1%
10	9.1%	10.9%	0.3%	Not determined.
11	8.1%	11.0%	0.4%	" "
12	8.4%	11.3%	0.4%	" "
13	7.8%	11.0%	0.4%	" "

From these figures it can be seen that not only an acetone extract of more than 10 per cent is formed, but that moreover a considerable part is soluble in alcoholic potash and that consequently factis acids are formed.

The result from No. 13 shows that substitute has nothing to do with the change, for this sample, as one will remember, only consists of rubber and sulphur.

In order to test this more closely, two samples were examined of which the composition was duly known:

	Rubber.	Mineral Filler.	Substitute.	Sulphur.
A	60%	25%	10%	5%
B	70%	25%	0%	5%

The determination of the alcoholic potash extract and the second acetone extract were carried out, both after four weeks as well as four months.

After four weeks were found:

	A.	B.
Acetone extract second time.....	4.2%	3.7%
Alcoholic potash extract.....	3.6%	0.4%

After four months were found:

	A.	B.
Acetone extract second time.....	24.8%	24.5%
Sulphur in acetone extract.....	0.6%	0.6%
Alcoholic potash extract.....	13.5%	12.0%

Therefore the oxidation may not be attributed to the influence of substitute. Whether the vulcanization of rubber plays a *role* must be tested more thoroughly, but may remain here out of consideration. The power possessed by the products of oxidation of being saponified is of importance for the testing described. It follows from the figures that *the determination of the factis acids must take place directly after the acetone extraction.*

It is further necessary that with samples containing old ground rubber as a filler, a certain reserve must be observed, in view of the results with samples 7 to 9 and A and B, according to which, after the second extraction with acetone, a considerable quantity of extract with alcoholic potash solution is found. It is expected that old rubber will be often present in more or less oxidised condition.

The Load Curve of Rubber

P. Schidrowitz and H. A. Goldsborough

According to De Vries and Hellendoorn (I. R. Journ. 57-26-17) the load curve for vulcanizates made with a small amount of sulphur in which most of the sulphur is combined shows an inversion. On the grounds of observation made during the last year the authors have come to the following conclusions: Rubber-sulphur mixings made with small proportions of sulphur, or rubber mixings with mineral fillers, but in each case without accelerators, and also with a small amount of sulphur show an inversion of the load curve at about the point where nearly all the sulphur is combined. In comparison with the original course of the curve these changes take place slowly. The mechanical deterioration which occurs by overheating under these conditions is remarkably small and the causes of this will be the subject of further research.

In rubber mixings with accelerators the phenomenon of the inversion of the load curve is shown clearly. These facts will be further investigated, because they will give an important explanation of the nature of the vulcanizing process. Probably the inversion is developed by heating the rubber mixing after the sulphur has already combined; this also produces a decomposition process in the rubber. By inversion is not meant what we call inversion in pure chemistry but a certain inversion of the physical or mechanical properties. The researches concerning this inversion of this load will in all probability answer many practical questions, as for example, the vulcanization with a minimum amount of sulphur. Whether vulcanizing with a small amount of sulphur for a long vulcanizing time produces better results than by using a large amount of sulphur and vulcanizing for a shorter time.

A Résumé of Recent Patents

The First Installment of This Article Appeared in The Rubber Age, issue of April 25, 1920. The Article Describes Briefly the Patents Taken Out on Processes for Obtaining Latex, Recovering Rubber, Vulcanizing Rubber and Producing Rubber Substitutes Since the Outbreak of the War

Victor Thomas in Clement-Ferrand, France (Swiss Pat. 66,133), has found that when rubber is mixed with lead oxide as a catalyser it can be vulcanized with the help of ultra-violet light. In order to diminish the formation of the injurious ozone, the vulcanization is carried out in a vacuum or in the atmosphere of an indifferent gas. For the production of thin films from vulcanized rubber the rubber sulphur solution is poured on a quartz plate and the solvent allowed to evaporate, after which the residue exposed to the ultra-violet light rays.

In order to cover metal objects with a solid clinging coating of rubber L. Doft, Rutherford, N. J. (U. S. Pat. 1,120,794), first coats the metal object with an alloy of copper, zinc and antimony by means of an electric current. Then the rubber covering is placed on the object and it is heated in the vulcanizer.

Up to the present time rubber was always colored with mineral colors such as antimony sulphurette, cinnabar, etc. Organic colors were used only as surface colorings. It is now shown that organic colors can be used for the coloring of rubber in the mass; in such cases these materials are vulcanization constituents. To this class belong the many vat dyestuffs as bromindigo, thioindigo, thioindigoscarlett, indanthrene blue, alizarineindigo, G. etc. (R. Ditmar, U. S. Pat. 1,113,759) (Freidr. Bayer & Co., Austrian Pat. 69,968), and Azo dyes, as helio fast red R L, helio fast yellow 8GL Extra (K. Gottlob, U. S. Pat. 1,113,614).

A rubber like product is obtained if Acryl acid esters are polymerised with about 5 per cent of sulphur by heating two hours at 40°C. O. Robin (U. S. Pat. 1,121,134.) Beta-Gamma-dimethylerythren is vulcanized by autopolymerisation by standing in the presence of piperidine, two hours at 160-165°C, there is obtained a substance resembling hard rubber. (Farbenfabriken vorm Friedr. Bayer & Co., of Leverkusen) (Austrian Pat. 67,833). By using a lower temperature or a shorter heating time a soft rubber-like product is obtained. (Austrian Pat. 67,834.) In place of piperidine its derivatives may be used (Austrian Pat. 67,835), or aliphatic or hetrocylic bases can be used as tetramethylenediamine, thioureas, etc. (Austrian Pat. 67,836).

Friedr. Bayer & Co., of Leverkusen, have found a number of compounds which have the properties of considerably accelerating the vulcanization of natural or artificial rubber. As especially useful for this purpose are piperidine or its homologues (Austrian Pat. 66,173), or its derivatives (Austrian Pat. 66,174). Difficultly volatile aliphatic bases or difficultly volatile derivatives of the easily volatile bases, as tetramethylenediamine, the addition products of carbon disulphide and dimethylamine (Austrian Pat. 68,724).

F. Hoffman & K. Gottlob (U. S. Pat. 1,126,469) patent as accelerators basic reacting ammonia derivatives or Bases whose dissociation constants are greater than 1x10-8, as p-phenylenediamine, aldehydeammonia, benzylamine, etc. (German Pat. 280,108, Austrian Pat. 69,974).

S. J. Peachy Stockport, England (U. S. Pat. 1,157,177), makes use of p-nitrosodimethylaniline or its homologues for accelerating the vulcanizing process.

As a suitable accelerating substance P. J. Murril, New York, N. Y. (U. S. Pat. 1,182,501) recommends Bone oil.

IV.—Rubber Goods, Faktis and Rubber Substitutes

Rubber sponge or other porous rubber articles are obtained according to the process of P. Schidrowitz and H. A. Goldsborough (U. S. Pat. 1,156,184). If the latex is warmed with a solution of ammonium carbonate and finely divided sulphur or a polysulphide on a water bath, and then coagulated through the addition of acetic acid with constant agitation, the separation of the rubber follows in spongy form. The usual fillers, coloring materials, etc., can also be added. The spongy rubber mass is then vulcanized under water.

For the production of rubber with papillary forms or folds in the surface for use in the production of rubber shoes or non-skid tires, the rubber is compounded with the usual fillers, colors, etc., and given the desired surface by passing through the rolls, then subjected to cold vulcanization. C. D. Mason, Naugatuck, Conn. (U. S. Pat. 1,183,022 and 1,883,023).

A rubber product which is useful for the production of durable rubber soles, tires, etc., is obtained by the process of J. R. Sanford, Salisbury, Conn. (U. S. Pat. 1,206,920), by mixing with the rubber mass short, clean, textile fibres and then vulcanizing the mass. For the same purpose E. Tronz, in Wien (German Pat. 289,418), uses horse-hair or similar material. C. Poechetti (Swiss Pat. 74,554) makes use of fat-free animal hair ¾ mm. in length.

A Rubber Substitute

An elastic mass which will serve as a substitute for rubber is obtained, according to the process of A. A. Glidden, of Watertown, Mass. (U. S. Pat. 1,171,187), if the finely pulverized scrap of vulcanized rubber is heated at 100-120 for two to three weeks in a closed vessel with high fatty acids, as stearic acid and unsaturated hydrocarbons, for example 1, 3 Butadiene or its homologues.

Rubber masses or rubber objects having great tensile strength and nerve are obtained according to the process of Lambertz in Berlin-Wilmersdorf (German Pat. 279,261, Swiss Pat. 70,744). The crude rubber is dissolved in Benzol or benzine hydrocarbons with the addition of the white of eggs, kneaded and after dipping on the forms is subjected to cold vulcanization. If it is desired to subject the objects to hot vulcanization then sulphur must be added to the mass.

By vulcanizing a mixture of rubber and horn-like substances, a mass is obtained which can be used for the production of soles, tires, etc. (C. Pacchetti, in Mailand, Swiss Pat. 69,664).

Chlornaphthalene, especially tetra, penta, he a and hepta-chlornaphthalene, according to the German Patent 277,549 of the Condensite Company of America, Glen Ridge, N. J., have the property of facilitating the combination of the rubber with sulphur in the vulcanization. It remains in the vulcanized rubber in the form of a solid solution. According to the amount used one can obtain either a soft or a hard rubber-like product. The mixtures are especially useful for electrical wires and cables. On account of its resistance to chemical action they can be used in the production of lacquers for coating metals. They will withstand high temperatures better than hard rubber and are therefore useful as packing and insulating material for steam and water pipes. Also for the production of tires and for impregnating fabrics these substances are especially useful, because the fabric is impregnated much better than when rubber is used alone.

Rubber is dissolved in a solvent which does not react with chlorine—for example, carbon tetrachloride and chlorine is conducted into the solution which is provided with a condensor, until at last there is an increase in weight of about 40 per cent. According to the patent (Swiss Pat. 74,750) of S. J.

(*Continued on page* 113).

A New Departure In Education

Goodyear Industrial University the First Institution of Its Kind in the World—Complete Description of the University and Goodyear Hall in Which It Is Housed

In an effort to more comprehensively and effectively humanize industry, and to further its fundamental principle of preserving the human element in industry, and of building men and women as well as product, there has just been established in Akron by the Goodyear Tire & Rubber Company a mighty educational institution known as Goodyear Industrial University. It is not only the world's first industrial university, but an educational institution without parallel as to wide range of studies embraced in its flexible curriculum, and also as to the personnel and democratic complexion of its vast student body.

Goodyear University

Goodyear University, with a faculty of 115, with an enrollment of more than 5,500 men and women, including executives, office employes and manual workers among the Goodyear company's 35,000 Akron employes, has commodious and fully equipped quarters in Goodyear Hall, the newly dedicated employes recreational building, recognized as one of the finest buildings ever erected by an industrial concern fundamentally for the welfare and physical and mental developments of its employes.

At simultaneous dedication ceremonies for the Hall and University, at Akron on April 17, President William Oxley Thompson, of Ohio State University, Columbus, Ohio, paid striking tribute to the broad vision and fundamental principles underlying the motives which actuated the establishment of the great industrial institution of learning, characterizing its establishment as one of the greatest humanizing efforts known to the industrial world. He characterized it also as an undertaking which will be watched with intense interest by the entire world, supplementing such comment with the conservative prediction that the University would prove a potent factor in stabilizing industry, in allaying industrial unrest, and in bringing about a broader and better understanding between capital and labor and a more harmonious relationship between industrial heads and manual workers.

Goodyear Hall, which contains complete university accommodations, including faculty office suites, sixty-five large class rooms, lecture and assembly rooms, and several fully equipped laboratories, is complete to the most minute detail as to facilities and equipment for mental and physical development, and the recreation of Goodyear employes.

The building stands as a monument to the fact that Goodyear devotes its energies to the building of men as well as machines, and it is perhaps this broad vision and fundamental principle of democracy in industry which has been primarily responsible for Goodyear's remarkable growth. Twenty-two years ago the company had 125 employes and was doing a business of $200,000 per year. Today, with branches and subsidiary companies in every part of the world, Goodyear has over 50,000 employes and expects to attain a goal of $250,000,000 worth of business in 1920. Its tire production alone will approach 10,000,000 this year, now averaging 50,000 a day.

A dedicatory tablet in the Hall contains a thoughtful and abiding message, perhaps best expressive of the purpose to which the institution will be put. It reads:

"Goodyear Hall"

"To Goodyear men and Goodyear women, wherever they may be, a great army of people, touching hands around the globe; to education and fellowship; to the forwarding of every right ambition; to the realization for every man and every woman of his usefulness to self, family, company and country; to better understanding between man and man, between management and men; to mutual helpfulness and service; to the fullest loyalty to America and the fulfillment of her promise of moral, intellectual and industrial leadership among the nations; to loyalty and friendship and fair dealing and good will—to these purposes this building is soberly and prayerfully dedicated."

Goodyear University's doors of learning are open to all alike. It is designed to fulfill the company's endeavor to build men and women as well as product, and to foster the spiritual and intellectual as well as the material. Fundamentally it is an industrial institution teaching such branches of academic and scientific work as are necessary to the development of American industry, and is intended to create opportunities for all of the 35,000 men and women for whom its advantages are available, to broaden their usefulness to their own benefit primarily.

GOODYEAR HALL

Education for All

It is for the lad of sixteen to eighteen years of age, forced out of school to help support a fatherless family. It is for the foreign born rubber worker anxious to become Americanized. It is for the illiterate anxious to overcome his handicap and to learn the rudiments of American education. It is for the high school or grade school graduate who either did not or by stress of financial circumstances, could not avail himself or herself of the opportunity of a college education. It is for men and women whose college careers were interrupted and incompleted, and for whom college doors will never again swing open, and it is for college graduates anxious to go higher and train themselves along specific scientific lines calculated to best fit them for a further persuance of their vocation in the great rubber industry. It is for manual workers and factory foremen alike; for office clerks and office executives, covering a more complete scope of study in its flexible curriculum, than any other institution of learning in the world.

It has a faculty of more than 110, and it has an enrollment of nearly 6,000 in its 600 separate classes which are so conducted as to permit attendance of office employes and by factory workers from all three daily eight hour shifts. Courses are provided ranging from the fundamentals of rudimentary grade school education to the post-graduate courses in mechanical and chemical engineering and rubber chemistry and

rubber technology, the curriculum embracing a wide range of study. There are four distinct divisions, the production school, sales school, school of commerce and school of household arts. Just a few of the studies specialized in are mathematics, mechanical drawing, physics, chemistry, engineering, personnel in business, better letter writing, organization management, corporate organization, finance, business economics and effective stocking. These latter courses are more specifically for executives and office employes aspiring to executive capacity.

Degrees Given

Members of the production flying squadron, men who are either experts or studying to become proficient in factory production matters, are offered a three year specialized course upon completion of which diplomas are granted with a degree of Master Rubber Worker. Members of the engineering flying squadron are offered a three year course in which to qualify for the degree of Graduate Rubber Mechanic.

Special apprentice classes are formed for newcomers to Goodyear and beginners in factory work where skilled labor is essential. The apprentice machinists' course is three years, also that for an apprentice draftsman. The former is more for young boys ranging in age from sixteen to eighteen years who desire to take vocational training and become skilled mechanics. The special vocational course for foremen and factory executives covers a year of study and class work, while there is also offered an eighteen months' course for inspectors. Stenographic and typist courses are offered also for Goodyear girls, in addition to the school of household arts including domestic science, housekeeping and sewing classes instruction.

There are at present 1,000 inspectors taking the special course for inspectors and over 2,500 taking the production school course while 350 shift foremen are specializing in study calculated to fit them for higher executive positions in factory work. The apprentice courses are so conducted that young boys may enter the Goodyear factory and receive a remunerative wage while they are learning. They devote thirty-six hours a week to shop work and ten hours to classes, receiving pay for the full forty-six hours. Every six months a nominal increase is granted, the amount depending upon each apprentice's ability to grasp details and advance in his machine work.

At the end of the three year course, he is an expert machinist and is eligible for another three year course in which he can be trained as a foreman or factory mechanical executive. One of the unique and distinctive features of the apprentice school is the manner in which shop work is tied up or co-ordinated with class work. The young apprentice not only is taught the "why" and "how" of each operation but the fundamental principles to be employed in turning out certain kinds of work. He is given just enough mathematics to enable him to understand thoroughly the mechanism he is operating, and the use to acquaint him with every part of his machine, the entire course being closely co-ordinated so as to afford elementary education as well as education in machine operation.

Instruction in the Mute Language

One of the interesting courses about to be established by the University will be that for the instruction in the mute language. Goodyear has the largest colony of non-speaking, deaf or "silent" in the world, employing over 700 silent men and women in both factory and office work. They have their own community or colony activities, but are thrown into such constant contact with those not deprived of the faculty of speech and hearing that many of the latter have expressed a desire to learn the silent language in order to converse with them without resorting to the pad and pencil. This course will be for speaking persons. A great many factory workers are enrolled due to the fact that in several instances they are grouped in bands under silent foremen or instructors and are evincing a keen interest and desire to learn the silent language. There are also special courses for the mute men and women. The most popular among these for men is the mechanical drawing class, for there are over 300 mutes enrolled in special classes designed for their benefit.

Perhaps no one man is more directly responsible for the establishment of Goodyear Industrial University, than Vice-President and Factory Manager P. W. Litchfield, of the Goodyear Company. He long has been the mainspring of all Goodyear recreational and educational activities, and stately Goodyear Hall is his dream of several years ago finally materialized. Mr. Litchfield is chairman of the Goodyear Board of Education, having direct charge of the Industrial University's affairs. Harry Blythe, formerly of Canton and a Goodyearite for the past four years, has been placed in charge of all affairs at Goodyear Hall, both as manager of Goodyear Hall and the head of the University. Mr. Blythe is thirty years of age, his official appointment as head of the University making him probably the youngest college head in America. He is a graduate of Mt. Union College, Alliance, Ohio. Under him, A. C. Horrocks, formerly of Cleveland, is designated as head of the factory school while Coach Ed Connor, formerly in charge of all athletics and recreational work at Camp Sherman during the war, is designated as head of physical education in Goodyear Hall. Among prominent members of the faculty under Mr. Blythe and Mr. Horrocks are Dr. John A. Custer who for many years occupied the chair of history at Lawrence College, Appleton, Wis., and Prof. W. E. Emery, formerly of Carnegie Institute of Technology, at Pittsburgh, Pa. Special language instructors also have been engaged so that Goodyear employes desiring to be transferred to South America upon completion of the new Goodyear plant at Rio de Janeiro, may study Spanish and other languages which will be of use to them in their new field of endeavor.

Popularity of the University

Goodyear employes when first informed of the company's plan for a University several years ago grasped the opportunity with an eagerness which exceeded even the fondest hopes of executives. The minute the University was established hundreds of men and women eagerly crowded the registration offices, records showing 5,000 enrolled in the various classes before formal dedication of the University on April 17th. So many are evincing such a keen desire to avail themselves of the opportunity afforded that further expansion of the University is considered highly probable. There are sixty-five class rooms in Goodyear Hall in addition to faculty offices, four large and completely equipped chemical and physical laboratories and several large assembly and lecture rooms.

Goodyear Hall in itself is a thing of beauty. The idea of a double stage serving either separately or simultaneously, the handsomely appointed auditorium, or the immense gymnasium, is embodied in its construction. The auditorium is of acoustic shell style of architecture, and is one of the largest in Ohio, seating 1,686 people. The French Renaissance scheme of interior decoration is used throughout, with an indirect lighting system adding to the grandeur of the simplicity of design employed. Two handsome mural paintings adorn the side walls. One is of the Bay of Naples with Mt. Vesuvius showing in the distance, while the other is a scene from a South American rubber plantation, picturing the natives in the Amazon region loading rubber ready for export. There are handsomely decorated and large corridors, rest rooms for ladies, smoking rooms for men and check rooms. One of the outstanding features of the auditorium is its Gustavino tiled ceiling. The stage has double aperture. It is forty feet wide and thirty-three feet deep with floor laid in sections so as to permit its removal for installation of swimming tanks, ice skating rinks or other appurtenances for extraordinary acts. A complete counter-weighting system is employed for shifting scenery for either the opening of the auditorium or the gymnasium. The gymnasium with balcony and main floor has a seating capacity of more than 5,000. The floor in itself is of sufficient size to permit five games of basketball simultaneously. In size and

completeness of equipment the gymnasium ranks with the greatest interior athletic collegiate stadiums in the country. Below it are 5,500 locker rooms for men and 54 individual shower baths. For women there are 200 lockers and eighteen shower baths in addition to community and lounge rooms and dormitories.

On the third floor of Goodyear Hall are legislative chambers for the industrial legislators of the House and Senate of the Goodyear Industrial Republic. They are patterned closely after the Senate and House Chambers at Washington in respect to floor arrangement, with spectators galleries, anterooms and private offices.

The immense cafeteria on the sixth floor is capable of accomodating 4,000 people an hour and is the largest in Akron and one of the largest in Ohio. Beside the three main entrances, to Goodyear Hall, entrance can also be gained through a tunnel leading from the factory building without exposing themselves to the weather and crossing the street through any traffic.

The immensity of the building may be realized when it is stated that a corps of seventy-five janitors is necessary to maintain it in spick and span fashion. The building towers seven stories high and is of red pressed brick.

Every day thousands of employes swarm the building, taking advantage of the various forms of recreation provided. At noon time the gymnasium floor usually is occupied by hundreds of dancers, the company furnishing the music for this recreation. The twelve bowling alleys, the six rifle ranges and eight billiard and pool tables constantly are in demand while the library is exceedingly popular.

Many great manufacturing concerns long have appreciated the necessity of devoting greater time and effort to the promotion of welfare activities along an elaborate scale among their employes in order to more comprehensively humanize industry, but perhaps none in the United States or in the entire world is doing more in respect than the Goodyear Company. And the establishment of Goodyear Hall and Goodyear Industrial University constitutes perhaps the latest and most striking exemplification of the typical "Goodyear Spirit." The mere fact that Goodyear has more employe-stockholders than any other concern in the world and that over 21,000 Goodyear employes, both men and women, are Goodyear's partners and are owners of over $10,300,000 worth of the company's stock, stamps this great concern as a leader in this respect, and is perhaps the nearest successful approach to the ultimate industry, for it is not merely a great manufacturing organization; it is an institution with a soul,—an industrial enterprise with a heart,—a commercial activity built upon human happiness.

As for the University itself, its establishment has been the most powerful influence ever exerted to conduce harmonious relationship between capital and labor in Akron. The University constitutes a unique experiment and one that is being watched by the entire world. It is proving remarkably successful so far as indicated by the large enrollment, and should serve to be copied extensively by other industrial concerns in America. Its enrollment is steadily mounting and has increased from 4,000 originally to nearly 6,000 while officials of the University state that they expect an enrollment of nearly 8,000 by the first of July.

A Résumé of Recent Patents

(*Continued from page* 110)

Peachey, Stockport, England, there is obtained after distilling the solvent a plastic mass which according to the amount of chlorine taken up is more or less soft and bendable. This is mixed with camphor and the product is used in the production of artificial leather. In place of distilling off the solvent the product can be obtained by precipitation with alcohol.

According to A. O. Bourn, Bristol, R. I. (U. S. Pat. 1,203,966), there is obtained a rubber substitute by heating a mixture of a vulcanizable oil, rubber or reclaimed rubber, sulphur and an addition of wood tar creosote whose stability is essentially increased by the addition of the creosote.

Georges Nuth, of Neuilley-sur-Seine, France (U. S. Pat. 1,159,257), has discovered the following process for the production of a rubber-like mass. Unsaturated fats or oils, such as chinawood oil, linseed oil, etc., are treated with sulphur chloride, the halogenated product obtained (Faktis) is treated with an aliphatic or aromatic amine. At a suitable dilution it is treated with an acid-forming salt as sodium acetate, calcium carbonate. Then the product is polymerized by heating in the air or by conducting air or ozone in the cold in the presence of a siccative. The polymerized product is vulcanized by heating with sulphur or by treatment with sulphur chloride in the cold. With the addition of oils, paraffin, vaseline, etc., there is obtained a soft or hard elastic product according to the amount used. The material is used for insulating electric wires and as a resin substitute in the preparation of lacquers. In the U. S. Pat. 1,159,258 the same inventor has modified the process in that the unsaturated oil is treated with sulphur dichloride not sulphur chloride.

A useful rubber substitute is obtained according to the specifications of Dr. Hugo Bayer, of Wien (German Pat. 288,968), if linseed oil is heated with sulphur and then the product warmed with dilute nitric acid. The washed and dried product when used in mixings with resins, rubber, etc., can be vulcanized.

Kent Biltz, of Neukirchen (German Pat. 300,542), obtains a rubber substitute which is especially useful in the production of tires, by the action of calcium bichromate on a solution of sulphur in turpentine oil with an addition of linseed oil, the reaction taking place at elevated temperature. To the reaction mixture is added copper oxide ammonium cellulose solution with agitation and heated until the formation of a solid elastic mass. In order to make the product more resistant iron filings, glass powder, or the like, can be added.

A hard rubber substitute is obtained according to the specifications of Louis Callowdon, of West Bromwich, England (U. S. Pat. 1,128,851), if cellulose is made into viscose in the usual manner then mixed with phenol and formaldehyde and heated. The material can be added to rubber, gutta percha, balata, etc., and vulcanized.

In order to protect masonry against moisture A. C. Horn, N. Y. (U. S. Pat. 1,149,519), has found that a product which is obtained by mixing a slightly vulcanized oil with fillers as clay, kaolin, whiting, etc., and a pigment as zinc white, lampblack, etc., is very useful.

A hard insulating material is obtained if a mixture of finely pulverized zinc oxide, talc, slate, asbestos, sulphur is mixed with a solution of copal or kauri resin in linseed oil or China wood oil which has been thinned out with naphtha. The product is then heated in forms for several days, gradually raising the temperature to 120° C.

For the production of a hard rubber-like mass according to the specifications of Metall and Isoleerwerke B. m. b. H. in Meinirigen (Austria Pat. 67,694) finely ground rubber scrap is heated with oils, mixed with fillers, oils, and sulphur; vulcanized, ground, and added to rubber substitutes, as guayule, balata, oils, waxes, resins, etc., sulphur, and vulcanized the second time.

Fresh Air and Production

By John Felix Leonard

Since the more general adoption of various plans whereby the workers share in the management of a plant to some extent, open minded employers are learning some facts vital to successful management and higher production.

A lesson of this sort may be read by employers in the experience of the Gates Rubber Company of Denver, Colo. The firm employs about 1,500 people. They organized a club for the workers which is so managed as to overcome the often seen indifference of workers to active participation in such organizations. It is not open to every worker, but is held out as an inducement to those who manifest in their work, a better than ordinary interest. By thus making it difficult, in a measure, to gain entry, experience shows that the selected employes regard entry into it as an honor. Naturally, the club represents the best workers from every department. The organization has an active voice in the management, unusual even in these days of increasing participation in management.

During the "flu" epidemic the members discussed thoroughly the subject of reducing its effects in their plant. It was agreed that ten minutes' exercise in the open air, twice a day, for all the employes would be very beneficial. So the management ordered it. The results were so satisfactory, in the reduction of absences from sickness, in a refreshened interest in the work after the exercises, in greater production, that it was continued even after the cessation of the "flu" epidemic.

Ventilation and Production

The lesson to be gained for all is the importance of fresh, clean air in a plant and its vital relation to, and effect on, production. Ventilation experts state that, with the present development of ventilation equipment, it is not necessary to resort to anything so radical as the turning out twice a day of the entire force—that the fresh air and its invigorating effects on the workers can be achieved by proper installation of adequate ventilation equipment.

Efficiency experts have arrived at the same conclusions through study of fatigue. Their decision on the importance of fresh clean air on the worker's stamina and output is one of those curious but frequently met with experiences in business—the "discovery" of a truth which is so elemental as to cause one to wonder why it was not observed long ago. For we all know how much more energetic work we can do under the stimulation of the open air as compared to working indoors where proper ventilation does not furnish an abundance of fresh air of equivalent value.

Why Fresh Air?

The reason for this is simply explained. The fresh air of nature consists mainly of oxygen and nitrogen. It is the oxygen that is the energizer and purifier. When air is once breathed, the lungs exchange the oxygen in the air for carbonic acid gas which is expired. This gas contains poisons carried off from the system and when air is breathed over and over again the system is absorbing the poisons in the carbonic acid gas, which also, of course, lacks the life-giving oxygen, thus causing sensations of fatigue.

The system of the worker, breathing such vitiated air, is unable to renew his strength because the blood-purifying oxygen is lacking. Under such air conditions he soon evidences a slowing up, no matter how hard he tries, and it is not long before fatigue sets in. How soon this will begin is dependent upon how much he is shut off from a proper supply of fresh air, how many men work in the room in proportion to its size, presence of dust, smoke and impurities in the air.

The intimate relation between a man's nervous system and a proper supply of fresh air is easily proved, even to a layman. Our very instincts furnish us with ready proof. For when we are "worked up," nervous or irritable, nature urges us out in the open air where fresh air lays its soothing hand upon us with swift effect.

Normal Conditions Must Exist

Since efficiency experts have come to regard the worker more as a human being, subject to nature's laws, instead of in the light of a machine, much progress in greater efficiency and production has been made. They have found out what the physician has long known—that it is not in a sense a man's muscle that determines how much work he can do as how much nervous strength there is back of the muscle. In other words, a man is only so strong as his nervous system, or is only at top efficiency while all conditions that affect his nervous system are normal. This realization soon brought into the foreground the direct and immediate effect of fresh, clean air upon the worker and production, and led to noticeable improvement in factory ventilation.

Work Affected by Poor Air

When the manufacturing processes are such as to give forth fumes, as in finishing rooms, where traces of smoke or dust linger in the air, the lowering of the worker's efficiency is, of course, far more pronounced and immediate if provision is not made by proper ventilation to keep the vitalizing balance of clean fresh air constant and uniform.

Fatigue studies have shown two types of work, that are most subject to slowing up when proper air supply is lacking—the monotonous job and the job where very close application is required. The monotony, the sameness of routine, has a dulling effect—a sort of soothing effect on the worker's nerves—which tends to cause him to "let down" without his being aware of it. Unusual skill, such as fine work or high speed or dangerous machines keep the man "keyed up," have a direct tax on his nervous strength. Both of these represent opposite kinds of work, one where the stimulation of fresh air is required for the monotonous task and the soothing, refreshing effect of normal air is essential to the man on the "nervous" work. For in fresh air we have the anomalous effects of its being both calming and stimulating.

Practically all labor in a manufacturing plant is comprehended under these two classes of work. It is therefore manifest, why, if the maximum production is to be attained, fresh air must be brought indoors to the worker in the abundance of nature.

Where men must work in overheated quarters, where dust is thrown off, or where fumes arise, the "blower" and duct system can reach them and keep their breathing zone clean and vitalizing. The unit system of ventilation by fan installation is favored by many, particularly for general ventilation, because a number of smaller fans can be located in various parts of the plant and operated in part or as an entire system, dependent upon conditions. This unit fan system also has its advantages inasmuch as should any trouble arise with a central blower, necessitating its stopping, the entire plant is not deprived of ventilation, resulting, possibly in serious discomfort to the workers.

The many production benefits, derivable from good air conditions in a plant indicate that too many manufacturers have too long overlooked the fact that they can pick greater profits "out of the air."

Industrial Management April, 1920.

Personals of the Rubber Trade

McCarty Sales Manager for Standard Tire Company—Fisk Promotes J. A. Horner—Overland Tire Has Experienced Head—Rendon with International Rubber—Price Now with Vanderbilt

McCarty Sales Manager for Standard

W. R. McCarty has recently assumed the duties of sales manager for the Standard Tire Company, of Willoughby, Ohio, makers of "Tiger-Foot Tires." Mr. McCarty has been connected with several of the large automobile tire companies, having served for several years as branch manager for such well known organizations as Firestone Tire & Rubber Company, Rubber Products Company and the Portage Rubber Company. His activities have always been confined to the sales department and he is widely known among the tire trade as an organizer and executive.

The securing of the services of Mr. McCarty is but another step in the growth of the Standard Tire Company, their production now being up to capacity, with the plant at Willoughby working over time. New buildings are being erected to take care of the increased business and the sales for 1920 bid fair to exceed the allotted quota for that period.

Fisk Promotes Horner

John A. Horner, former branch manager at Baltimore, has been appointed manager of the Baltimore district of the Fisk Rubber Company, with headquarters in that city. Mr. Horner succeeds E. J. McLaughlin who has been granted a leave of absence because of ill health. The new district manager's appointment was effective April 1. Mr. Horner is being succeeded as Baltimore branch manager by C. A. Warren, formerly manager of the Fisk Rubber Company's branch at Roanoke, Va.

Mr. Horner has been connected with the Fisk Rubber Company since August, 1911, when he entered its employ at the Baltimore branch. In January, 1913, he was appointed salesman out of this branch and in June, 1915, he was made manager of the Richmond, Va., branch. On January 1, 1918, Mr. Horner reported for active duty with the United States Navy, serving until January 30, 1919. He immediately re-entered the employ of the Fisk Company as manager of its Fort Wayne, Ind., branch. On November 1, 1919, he returned to Baltimore as branch manager where he remained until the present time.

Overland Has Experienced Head

Among the new tire companies that are attracting unusual attention in the rubber industry is the Overland Tire & Rubber Co., of Omaha, Neb. Although this concern has just recently started actual production of tires, the organization back of it is of such widely known standing in the tire business as to immediately place it among the most widely discussed companies of its kind west of Chicago.

The company is headed by Fred C. Rudisell, who is known throughout all of the Western territory as a tire salesman extraordinary and who is general manager, secretary and treasurer.

Ten years ago, Mr. Rudisell started in the tire business as a salesman for the Gustin Bacon Mfg. Co., of Kansas City, which concern had the Diamond tire distribution for all of the Kansas City territory. From the beginning, his work attracted the attention of the Diamond organization in Akron and it was not long before he was appointed manager of the Diamond branch in Omaha.

As the Diamond sales rapidly increased in that district, rival concerns began to bid for his services and seven years ago he left Diamond to take charge of the Firestone business in Omaha as branch manager, with territory embracing Nebraska, Colorado, Wyoming, Southern South Dakota and Western Iowa.

F. C. Rudisell

When Mr. Rudisell took over Firestone affairs in Omaha, that territory stood fourteenth in Firestone volume of sales and ninth in cost of operation. Five years later, under Mr. Rudisell's supervision, the same territory ranked first in Firestone volume of sales, first in economy and lowest in percentage of operating cost. The business, during his last year with Firestone, amounted to $2,000,000. It is said that this record has seldom if ever been equalled by any competitor in that section of the country.

In view of the wide acquaintance Mr. Rudisell had established in the Western territory and the success he had achieved, he had for some time considered embarking in the tire manufacturing business on a personal basis. The formation of the Overland Tire Co. offered him the opportunity he had been waiting for.

As an example of the confidence placed in Mr. Rudisell by the trade in general, it is pointed out that several of the Overland Tire Company's most important distribution points were contracted for even before an Overland tire had been seen by the distributors. Today, the company is working at full capacity with plans already agreed upon for a vastly increased production next year.

New Sales Manager for General

S. S. Poor, formerly district manager of the United States Tire Company in the Philadelphia territory, has been appointed to the position of general sales manager of the General Tire & Rubber Company, of Akron, Ohio.

Ideal Increases Output

The Ideal Tire & Rubber Co., of Cleveland, Ohio, manufacturing Greyhound tires and tubes, announces an increase in their output of 300 tires a day, commencing June 1. This is made possible by an addition to the plant which will be finished by that date.

Additional production is necessary according to D. C. Hathaway, general sales manager of the company, in view of extensive distribution that has recently been established in the South and West.

Arrangements have just been concluded whereby the National Auto Supply Co., of Oklahoma City, Okla., is given distribution for the Oklahoma territory. The states of Louisiana, Mississippi, and the Southern part of Arkansas have been assigned to the Rapides Auto Company, of Alexandria, La. The Tri-State Tire Works, of Chattanooga, Tenn., is made distributor for the states of Tennessee and Alabama. The Texas territory has been divided into two parts and the Behrens Drug Co., of Waco, has the distribution in the northeast. The Elkins-Boyd Tire Co., of Fort Worth, takes the representation in the southwest. This territory is in charge of G. E. Buckingham, who is district manager.

Mr. Hathaway adds that no territory is definitely arranged for until the company is positive that its production facilities are sufficient to fill all the requirements of that territory.

"We do not believe in stocking up our distributors with initial orders and then falling down on future deliveries," he said. "We will consistently add distributors according to our production. A gradual growth of this nature enables us to be more discriminating in the selection of our distributors and dealers. Our representatives in the field rank as high in standing, in their territory, as the enviable position, from the standpoint of quality, occupied by Greyhound tires and tubes in the tire world."

Price Now with Vanderbilt

Announcement has been made by R. T. Vanderbilt, 50 East Forty-second Street, New York, to the effect that the firm's rubber department has been augmented by the addition of Gladding Price. Mr. Price has had a varied experience in different lines of rubber goods manufacturing and is well qualified to represent the firm in the field. Originally in the sundries department of the Revere Rubber Co., Providence, R. I., he later became connected with the testing department of the Goodyear Tire & Rubber Co., Akron, Ohio, and finally took charge of the factory compounding of the Davol Rubber Mfg. Co.

Lindsey Special Representative

T. S. Lindsey, formerly New York branch manager and more recently Eastern district manager of the Kelly-Springfield Tire Company's branches, has been made a special representative of that company's general sales department. He is well known in the trade, having been operating manager in the New York branch of the Diamond Rubber Company before joining the Kelly-Springfield forces in 1913.

Rendon with International Rubber

The International India Rubber Corp., of South Bend, Ind., has recently appointed F. A. Rendon to the position of export manager. Mr. Rendon has had considerable experience in this line and was formerly associated with the Pirelli Co., of Italy, and the Lee Tire & Rubber Co., of New York.

News of the Rubber Association

Extension of Bulletin Informative Service on Subjects of Various Classes—Personnel of Association Staff—Important Committees of Association Hold Meetings During April

The following bulletins relative to the activities of the Rubber Association of America, Inc., have been issued to the members of the organization over the signature of General Manager A. L. Viles:

Extension of Bulletin Informative Service on Subjects of Various Classes

April 22, 1920.

To Firm and Affiliated Members:

This is the first of the bulletins which members of this association will receive under an extension of the bulletin service heretofore conducted by this office to a limited extent through the medium of circular letters.

Distinctive bulletin forms printed in colored inks will be used to cover the dissemination of information for the present under the following classifications:

General information,
Traffic information,
Legislative information,
Industrial relations information,
Bureau for the exchange of mill information (surplus new and second hand material and equipment for sale and purchase).

The bulletins of each class will be numbered consecutively and will be issued as frequently as is necessary.

May we not suggest that provision be made in your office for filing these bulletins according to the classification indicated, thus building a convenient means of reference to the information emanating from the Rubber Association.

An index to the numbered bulletins will be issued at frequent intervals, to expedite reference to them.

Personnel of Association Staff

April 26, 1920.

To Members:

The following promotions in the staff of the Association, effective as of April 1st, have been approved by the Board of Directors:

Harvey Wilson, formerly assistant secretary and office manager, promoted to the position newly created of assistant general manager.

R. H. Goebel, formerly assistant to the manager of the traffic department, is appointed manager, traffic department.

The following meetings were held recently:

Executive Committee—Tire Manufacturers Division

The regular April meeting of the executive committee, Tire Manufacturers' Division, was held in the Rubber Association rooms on Wednesday, April 21, and was well attended. Particular interest centered about the discussion on the subject of establishing minimum and maximum cross section widths for pneumatic tires and to enable the subject to be thoroughly covered in both its commercial and technical phases, a conference had been arranged by the Executive Tire Committee with the executive committee of the Tire and Rim Association of Cleveland. A lengthy discussion of several suggestions respecting the way in which to accomplish the end which seems to be the desire of all manufacturers, resulted in no definite recommendation and the subject was given to a special sub-committee appointed at the meeting for a detailed study and report to the Tire Executive Committee at its next meeting.

Several matters of a routine nature were also given attention by the Executive Committee.

Mechanical Rubber Goods Specification Committee

On April 2 in the Rubber Association rooms there was held a meeting of the Mechanical Rubber Goods Specification Committee at which a large number of subjects connected with the negotiations of the Specification Committee with users of specification mechanical rubber goods was handled.

The work on these problems was principally of a routine nature, but definite conclusions were reached with respect to some matters, principal among which is the decision to recommend to all manufacturers of mechanical rubber goods that bids on M. C. B. air brake hose be confined to the 1913 M. C. B. Specifications as last amended by the Manual of Standard and Recommended Practice of the Master Car Builders' Association, for 1919. It is to be understood distinctly, however, that the foregoing has no application to car signal hose which may be furnished to a railroad's individual or any other specifications.

The committee felt also with respect to the matter of inspection and tests for rejection of specification mechanical rubber goods, that it should recommend to manufacturers that the period for acceptance or rejection, upon test, shall be limited to sixty days from date of shipment. In this connection also it was decided to recommend further to manufacturers, that all specification rubber goods be tested for acceptance or rejection at the point of manufacture.

It is planned for the Specification Committee to hold its next meeting in Asbury Park during the week of June 22.

Uniform Basis for Computing Extra Charge for Making Rubber Belts Endless

Some time ago the Executive Committee of the Mechanical Rubber Goods Manufacturers' Division recommended to belting manufacturers that they adopt a uniform basis for computing the extra charge for making belts endless, which has been very generally in effect, on the following basis:

For belt under 12 in. in width, 6 additional feet.

For belt 12 inches or more in width, 8 additional feet.

Recent examination of the file on this subject indicates that acknowledgments from all interested companies approving the recommendation of the Executive Committee have been received and manufacturers have been so advised. This should insure uniform conditions in the rubber belting manufacturing business in this connection.

Akron Secures Overland Account

Announcement has gone out over the signature of Fred C. Rudisell, general manager, secretary and treasurer of the Overland Tire & Rubber Co., of Omaha, Neb., to the effect of the advertising account of that concern has been placed with the Akron Advertising Agency Co., of Akron.

M. & A. M. A. Opposes Metric System

Following a referendum taken among its membership of more than 350 representative manufacturers of automobile parts and equipment, the executive committee of the Motor and Accessory Manufacturers' Association, at its recent meeting at Atlantic City, adopted resolutions opposing the introduction of the Metric System in American industry.

The resolution was prompted by the present active propaganda in favor of the compulsory adoption of the Metric System of Weights and Measures.

These reasons for opposing this move are definitely summarized in the resolution, which follows:

"Whereas, the members of this Association have formally registered their opposition to the adoption of the Metric System on the grounds that it is uneconomic; that the advantages of the Metric System are not offset by the disadvantages; that the benefits of the Metric System do not justify the enormous expense which would be entailed through the necessary changes in sizes of product and equipment (which would mean an excessive loss through destruction of the present equipment not adapted to the new system); and through the education of employees and customers.

"Therefore, be it resolved, that this committee express for the members of The Motor and Accessory Manufacturers' Association its opposition to any legislative action which would result in making the adoption of the Metric System of Weights and Measures obligatory, and further,

"Be it resolved, that this Committee commend to the members of this Association the work of the American Institute of Weights and Measures in opposing the compulsory adoption of the Metric System."

Brunswick Issues New Stock

Following the filing of its annual report which revealed net profits after charges and Federal taxes of $3,016,914, the stockholders of the Brunswick-Balke-Collender Co., of Muskegon, Mich., have voted for a new stock issue of $44,000,000 to take up the $6,000,000 common stock. This issue will be known as Class "B" common stock, par value $25, out of which will be paid to shareholders of record May 15 a 200 per cent stock dividend on the present $6,000,000 common which in turn will be designated as Class "A" with the par reduced from $100 to $25.

According to this plan four shares of the new Class "A" stock will be exchanged for one of the old common shares, and after the payment of the stock dividend shareholders may subscribe to the Class "B" stock to the extent of fifty per cent of their holdings or to the amount of $3,000,000. The remaining Class "B" stock will be retained in the treasury to be sold from time to time as the company requires working capital.

Net profits of the organization, after deductions, including Federal taxes for the year ended December 31, 1919, was $3,016,914, as compared with $1,162,562 for the previous year. The surplus after dividends, was $2,258,601, as compared with $734,196 for 1918. The balance of $3,016,914 shows a surplus equivalent, after deduction of preferred dividends to $44.64 a share ($100 par value) earned on the $6,000,000 common stock as compared with $13.73 a share earned on the common stock in the preceding year.

Expansion Throughout the Industry

New Rubber Firm Organized—New Cincinnati Company—Bergougnan Enlarging Plant—Zinc Oxide Shipments—Goodyear Builds Rim Plant —U. S. Compression Builds—L. & M. Changes Firm Name

New Rubber Firm Organized

The recent organization of the Mason Rubber Plantation Company, of Kent, Ohio, adds another firm to the ever-increasing number engaged in producing their own crude rubber. The new concern is organized under the laws of the State of Ohio, with a capital stock of $6,500,000 preferred and 155,000 shares of no-par value common. At the head of the firm are O. M. Mason and D. M. Mason, organizers of the Mason Tire & Rubber Company and the Mason Cotton Fabrics Company, the latter having been recently absorbed by the Mason Tire Company. The preferred stock has a par value of $100 a share, and both common and preferred stocks are described as being fully paid and non-assessable. The seven per cent cumulative preferred stock of the new organization is being offered with a substantial bonus of common by Mason Brothers, New York and Cleveland, fiscal agents.

It is stated that the firm is securing a producing rubber plantation in the Far East, and that it will also develop new plantations from jungle areas from time to time. The company will also act as brokers in the Far East, and will buy crude rubber from producers with a view to disposing of it in the United States. In accordance with an arrangement with the Mason Tire & Rubber Company, with which it is closely connected, the company has contracted to purchase at current market prices all the crude rubber produced by the Plantation Company. It is also stated that the active management of the company will be in the hands of an organization possessed of long and practical experience in the field.

New Cincinnati Company

The Hercules Rubber Corporation is the name of a new company that has been organized in Cincinnati by a number of well known Cincinnati men, including the following: president, Edward Haefner, of the Alms and Doepke Co.; vice-president, Theodore Heck, and the following are also interested in the company: Charles H. Adams, Dr. Paul Cassidy, Elmer Vossler and Albert Wissner. The company will manufacture automobile tires and will employ five hundred workers. An option on a site has been obtained and the equipment has been ordered. The size of the plant will be 300 by 200 feet, two or three stories high. The capacity of the plant will be 1,000 tires and tubes per day. It is said that the plant will be under way before long. The capital stock of the company is $1,000,000, one-half of which has been subscribed. It has a par value of $10 per share.

Bergougnan Enlarging Plant

In order to provide for the constant and rapidly growing demand for its cord and fabric motorcycle, automobile and motor truck pneumatic tires, and inner tubes, the Bergougnan Rubber Corporation, Trenton, N. J., has started work on a substantial expansion of its manufacturing facilities.

This expansion includes the construction of an additional factory unit and a large warehouse for storage of raw materials and finished products, as well as improvements in the interior arrangement of the existing model plant made with a view to effecting every economy in manufacture and at the same time to maintaining the Bergougnan-National-Surety standard of quality, which is largely responsible for the rapid progress of the demand for Bergougnan products.

Francis G. Hasselman is the architect in charge of the new construction work.

Zinc Oxide Shipments

The recent railroad strike gave a decided impetus to the demand for automobile and truck transportation. This in its turn will result in an increased demand for tires and these will need zinc oxide. During the strike two entire trainloads of zinc oxide were accepted for shipment from the New Jersey zinc Company as "relief specials" to insure continued adequate supplies of this raw material for the tire factories of Akron, Ohio. The accompanying illustration shows the first train about to leave the company's works at Palmerton, Pa.

TRAIN LOAD OF ZINC OXIDE ENROUTE TO AKRON

Goodyear Builds Rim Plant

Construction of a rim plant has been started by the Goodyear Tire & Rubber Company, near its Plant 2, Akron. The new plant devoted exclusively to the manufacture of rims, in which Goodyear has long been interested, is made necessary by the greatly increased demand.

The new plant will be a one story brick and steel structure 250 feet wide and 660 feet long. It will house 500 workmen and have a capacity of 10,000 rims a day.

Contracts for the buildings and machinery were let months ago, but construction was delayed by the weather. The steel for the structure is arriving daily and a large part of the rim-making machinery is on the ground.

Nearby large cantonment buildings similar to those used by the government will be constructed to house 1,000 workers. Each building will accommodate 80 men. There will also be kitchens, dining rooms and recreation halls. These will be ready for occupancy by the middle of May.

U. S. Compression Builds

With all the equipment installed and the 180-foot addition completed the factory of the U. S. Compression Inner Tube Company, of Tulsa, Okla., will be one of the most modern tire and tube plants in the United States, with a capacity of 4,000 tubes and 1,000 casings daily.

Automobile and rubber men, who have been in Tulsa recently to inspect the local plant, are greatly impressed with the progress of the corporation which is destined to put Oklahoma on the map in the tire world in the next few years. All of the machinery for manufacturing the puncture-proof inner tubes of the corporation will be of the latest type designed for rubber industries.

"During my experience of twenty-five years in the rubber business I have not seen a plant so modern in all its features," A. J. Pennington, general factory manager of the company, said yesterday. "We are making every effort to install our machinery and to prepare for the opening at an early date. The sale of all the tubes we can manufacture has been assured for months. Hundreds of new orders are received weekly from all over the country."

For more than a quarter of a century Mr. Pennington's activities have attracted nationwide attention in connection with some of the largest rubber industries in the country. He built the factory of the Lee Tire & Rubber Company in Pennsylvania and the plant of the Brunswick-Balke-Collender company in Michigan. He also has been identified with Johnson & Johnson and the Barrett Manufacturing Company.

The U. S. Compression Inner Tube Company is also contemplating the erection of another factory in Pittsburg, Pa.

L. & M. Changes Firm Name

Announcement has been made to the effect that the L. & M. Rubber Company, of Carrollton, Ohio, has changed its firm name to the Tuscan Tire & Rubber Company. Capital has also been increased from $500,000 to $1,000,000, the increased amount to be used solely for the purpose of increasing the output of cord tires, the "Buckskin" brand.

During the past winter the entire mold equipment has been changed to a new over-size equipment. Delivery of this has been made and the firm anticipates turning out 1,000 tires daily. C. W. McKone, formerly with the Gordon Rubber Company, has recently joined the staff of the Tuscan Tire & Rubber Company.

News From the Rubber Metropolis

Akron's Many-Sided Growth—Unauthorized Strike Impedes Progress—Wages Increase in Rubber Factories—Goodyear Dirigible Service—Akron Stock Prices—Gasoline Shortage Predicted

Akron's Many-Sided Growth

Returns from the 1920 census show that Akron, Ohio, now has a population of 208,435, an increase of 201.8 per cent since 1910. This increase is the largest to be reported up to the present time and places Akron ahead of St. Paul, Minn, in point of population. She is also ahead of Kansas City, Kans.; Dayton, Ohio; Memphis and Nashville, Tenn., and Syracuse and Albany, N. Y.

Tire production figures for 1919 show an equally astounding growth over those of 1919 in the four leading factories of the city. Goodyear Tire & Rubber Co. leaped from sales of $13,262,265 in 1910-1911 to $167,315,857 in 1918-1919 with 30,393 employees in Akron.

In 1915 the B. F. Goodrich Co. sales were $55,416,866 while the figure in 1919 was $141,343,410 with 28,000 workers. The sales of Firestone Tire & Rubber Co. in 1910 were only $5,300,000 while last year they were $91,078,513 with 17,000 employees. The Miller Rubber Co. sales were $11,000,000 in 1917 and $26,000,000 in 1919. In addition there are many other tire companies in the city whose production figures are not available.

Unauthorized Strike Impedes Progress

(*Special Akron Correspondence*)

"American industry is traveling at too fast a pace. It must stop and let the country catch up."

This, in effect, is the message given by President H. S. Firestone, of the Firestone Tire & Rubber Company, in a recent address.

Whether willingly or not, it appears that the rubber industry is slowing down. The strike of yardmen in many of the country's largest railroad yards, to be sure, has been a great factor in applying the brakes to factory wheels. But, on the other hand, business in general is showing a disposition to halt in its headlong race toward the golden pot at the end of the rainbow.

When the railroad strike broke out of a clear sky, Akron rubber factories found themselves short of fabric, which makes up a great part of the tire. Immediately the big companies started huge auto truck caravans from the textile centers of the East toward Akron, loaded to capacity with fabric. But the amount of fabric transported in this way was insufficient to supply the needs.

Officials of the rubber companies in the Akron district appealed to the trunk line railroads for help, and a special train was made up in the East. More fabric was brought to Akron in this way. But the demand still exceeded the supply. Attempts to borrow fabric from companies having some sort of a supply were unavailing.

But the fabric shortage was ever present despite the frantic efforts to keep the factories supplied. Early during the strike one large factory was forced to close for half a day. A short time later word was passed out that inventories would be taken in some plants. Quite naturally the factory wheels would not turn during inventory time.

Not only were the factory wheels turning rather uncertainly, but construction work on big factory additions came to a standstill on the first of May. Bricklayers demanded a scale of $1.50 an hour. Contractors refused to meet it, offering $1.25. Manufacturers stood behind the contractors. So the bricklayers left the jobs.

The situation caused by the strikes quite naturally gave rise to many rumors in rubber circles. One was that Goodyear had stopped work on its plant at Los Angeles, and the Firestone on its plant at Hamilton, Canada. Another was that certain large automobile manufacturers had cancelled tire contracts. Still another was that one large rubber company was so hard pressed for ready cash that an emissary was sent post haste to New York City to negotiate a loan of $5,000,000.

But notwithstanding these unexpected events, the optimism on the future of the rubber business is unshaken in Akron. The automobile industry is growing. The tire industry must expand to keep pace.

Wages Increase in Rubber Factories

Food prices in Cleveland and Akron, Ohio, have increased 90 per cent since August, 1914, according to a report of the United States Department of Labor.

But wages of factory workers in Akron's big rubber tire plants, have run old High Cost of Livin' a merry race and have beaten him to the tape by a margin of twenty-one points in the same length of time, according to charts prepared by statisticians of the Goodyear Tire & Rubber Company. They show an increase of 119 per cent in hourly factory earnings, since August, 1914.

In July, 1919, the two were almost neck and neck. The food price increase was 81 per cent, and the wage increase stood 82 per cent. Since then, however, wages have increased 37 per cent, while food prices have gone up only 17 per cent.

It is interesting to note in connection with the enormous percentage increases in wages and food prices in Akron, that the retail price of tires in the same period has increased only 41 per cent.

Goodyear Dirigible Service

(*Special Akron Correspondence*)

Goodyear Tire & Rubber Company officials plan to inaugurate the first blimp line in this country between the company's cotton plantation in Arizona and the new tire plant at Los Angeles. A "pony blimp," the small-sized dirigible developed by Goodyear engineers, will be used in this service, it is said. George Hockensmith, formerly in charge of the Wingfoot lake flying field, will be in charge.

Rubber Importers Move

Owing to increased business due greatly to the opening of a Singapore office, Rubber Importers & Dealers Co., Inc., announce the removal of their New York office from 67-69 Wall Street to 200 Broadway, where larger quarters will facilitate the handling of their customers' requirements.

Akron Stock Prices

(*Special Akron Correspondence*)

The pressure which has been apparent in the large stock markets of the country is at last being felt by practically the entire list of Akron rubber shares. Even the stocks of the smaller companies are affected.

Firestone common led the list in the downward trend during the first week in May selling off 12 points. The latest sales have been around the 170 mark. Goodyear common is down 8 points to 360; Miller common 10 points to 175, and so on down the list.

Of the Akron stocks listed on Wall Street, Goodrich is down to 65, and Kelly-Springfield to 110.

Little change is noticed in the preferred issues of all companies. During the first week in May, some of these shares displayed renewed strength and climbed a fraction or so.

The effects of the railroad strike and the general tightness of the money market are given as the reasons.

Following are the quotations on the Akron stock market for May 3:

	Bid.	Asked.
Amer. R. & T. com	83	85
Amazon Rubber	..	98
Firestone com.	160	165
Firestone 6 per cent pfd.	96½	97
Firestone 7 per cent pfd.	95	96
General com.	600	..
General pfd.	99	..
B. F. Goodrich com	64	66
B. F. Goodrich pfd	91	93
Goodyear com.	350	360
Goodyear pfd.	98	99
India Rubber	185	200
Kelly Springfield	108	112
Mason com.	30	..
Marathon com.	..	52
Miller com.	175	180
Mohawk com.	310	..
Portage com.	89	92
Portage pfd.	..	84
Republic com.	3½	4
Republic first pfd.	..	65
Republic second pfd.	35	40
Rubber Products	..	120
Star Rubber com.	165	185
Swinehart com.	80	85
Swinehart pfd.	..	90
Phoenix Rubber com.	..	23
Phoenix Rubber pfd.	..	90
Standard Tire com.	185	200
Standard Tire pfd.	..	95

Gasoline Shortage Predicted

(*Special Akron Correspondence*)

Recent announcement that a gasoline shortage is imminent has caused officials of Akron tire companies to express some concern. The impending shortage is bound to increase prices and thus restrict the use of automobiles, they point out, which in turn will decrease the number of tires used in the country.

In countries where the price of gasoline was high before the war, the automobile manufacturer's field was limited and rising costs of fuel may bring about a somewhat similar condition in this country.

Mason Tire Sales

(*Special Akron Correspondence*)

Sales of the Mason Tire & Rubber Company for the quarter ending April 30 will be between $2,000,000 and $2,500,000, it is officially reported. The sales for March were $1,067,000.

The Mason Tire & Rubber Company absorbed the Mason Cotton Fabrics Company March 31. The mill capable of producing 40,000 pounds of tire fabric per week is ready for operation.

MARKETS

Manufactured Rubber Goods

NEW YORK, May 5, 1920.

Rubber goods manufacturers have had a difficult time of it during the past fortnight, activities having been considerably curtailed by the congested conditions on the railroad as a result of the recent unauthorized walkout of employes. Conditions are still far from normal, and embargoes in various parts of the country are holding up shipments of raw materials to the plants of the rubber makers.

Motor trucks have been called upon to some extent to relieve this situation, but trucking facilities at the present time are at best insufficient to handle a situation of this kind. It is rumored, however, that one of the outgrowths of the railroad strike will be the establishment of a regular trucking service by one of the larger rubber companies, this service taking in Philadelphia, New York, Chicago and Akron, Ohio, the trucks to be run on regular schedules similar in every way to railroad methods.

Rubber manufacturers are viewing with some alarm the textile strike in New England mill centers. The mill operatives have been striking off and on for the past few years and have generally been getting all they asked for after short struggles with their employers. This time, however, it appears that the fabric manufacturers are going to give the workers a battle, and one of the largest producing companies in the country has announced its intention to close down all of its plants for an indefinite period rather than grant the demands of the operatives, which call for a general wage increase of fifty per cent. Should the company in question take the drastic action threatened, it is more than likely that other producers will follow suit. Just where the rubber goods manufacturers and other users of the fabrics will come off in this event is not clear, but the situation will be an alarming one even for the larger users who have reserve stocks on hand, while to the smaller users it will be little less than disastrous.

EXPORTS

Although foreign buyers want American rubber goods in quantities the exchange situation is still acting as an effective bar to the establishing of sufficient credits. Sterling exchange is showing more strength, but the franc and mark are still weak and show no immediate signs of strengthening. Some efforts are being made to arrange for the restoration of trade with Russia, but nothing definite has been done in this line as yet. Should some successful arrangements for the re-establishment of commercial relations be effected, American rubber manufacturers could look for orders running well into the millions.

AUTOMOBILE TIRES

Tire prices are being firmly held on the basis of recent advancements, and demand continues strong. Production has been interfered with somewhat during the past few weeks by the railroad tie-up, but this situation is improving. The shortage of tire fabrics has become particularly alarming to producers of fabric tires, and there is considerable difficulty in getting shipments from spinners' plants to the factories of the rubber producers. Goods shipped on railroads are subject to long delays, and in many cases are "lost" entirely for long spells. Motor trucks are being used to some extent to transport fabrics from the New England mills to Akron, but this expedient is a costly one. Producers have set for their 1920 goal production of $1,200,000 worth of tires, which is more than 400 per cent over the production of 1914.

BOOTS AND SHOES

Indications are that rubber-soled footwear will be more in vogue this summer than ever before. The high prices ruling on leather shoes doubtless contribute materially to the demand for canvas-top rubber-soled footgear for summer weather. In addition to the domestic demand for this product, there is considerable export inquiry coming from Mexico and South and Central America.

Buying of rubber heels has also increased during the past few weeks, and manufacturers of the more popular heels are working at capacity, although they are being retarded due to lack of sufficient quantities of raw materials.

Rubber manufacturers who have stuck to the production of composition soles for shoes are at last beginning to reap the reward for their efforts. Buying of this class of soles is increasing as high prices continue to rule on sole leather.

MECHANICAL GOODS

Buying of hose and couplings by the railroads has not yet been reported in any quantities, but manufacturers are looking for a good volume of this business in the near future. Demand for belting is being cut down somewhat by the continued strikes and walkouts in manufacturing centers, resulting in the shutting down of plants and consequently less wear and tear on belts already in operation, naturally making for less replacement buying.

MISCELLANEOUS

Prospects for a big season for rubber jar rings are growing dimmer and dimmer as the sugar shortage increases and prices continue to soar. A fair season is expected, however, in view of the fact that high prices on canned food products not requiring sugar in preparing will induce many housewives to preserve such commodities at home.

There is a good demand for garden hose as the spring season progresses, and sales are reported as being fairly heavy, despite higher prices brought on by increased production costs.

Manufacturers of rubber specialties, particularly rubber pads, gear coverings, etc., for automobiles are constantly expanding their operations and turning out new lines.

Cottons, Yarns and Fabrics

NEW YORK, May 6, 1920.

Recent declines in cotton futures have been made up by a steady recovery which the cotton market has staged during the past fortnight. The reappearance of unfavorable weather in the cotton belt last week led to a very strong market and reports from New Orleans to the effect that the increases in cotton acreage have been materially less than private advices have made them, served to further stimulate the market. Bear interests have started several raids during the past two weeks, but always the market has come back buoyantly and resulted in an advance.

While weather conditions were the prime factor of the strength show locally, there are a combination of circumstances which keep the market firm. In the first place, Southern spot markets are showing absolutely no inclination to follow the fluctuations in futures in the New York market, and spot holders in primary markets are holding the market firm at their own figures whether or not they are in a line with New York figures. While the market here was 37 cents per pound a short time ago, Virginia was selling middling cotton at 40 cents per pound, and other Southern markets at proportionate prices.

Much uneasiness is being expressed over the late start of the crop. Although increased use of fertilizer can overcome the handicap of a late start in growing the cotton, the later the season, the more time for the boll weevil and army worm pests to get in their damage. Growers are doing the best they are able, however, being unable to get sufficient labor to do all their plants.

Closing prices on May 5 were as follows: May, 40.70 @ nominal; June, 39.70 @ nominal; July, 38.47 @ 38.51; Aug., 37.47 @ nominal; Sept., 36.85 @ nominal; Oct., 36.35 @ 36.38; Nov., 35.85 @ nominal; Dec., 35.59 @ 39.60; Jan., 35.10 @ nominal; Feb., 34.65 @ nominal; Mar., 34.42 @ 34.43.

SEA ISLAND COTTON

Market prices on Sea Island cotton remain in a nominal state, selling prices being largely determined by conditions surrounding each sale. Offerings are restricted, however, and the new crop is reported as being well sold up. Spinners of fabrics for automobile tires are not placing much reliance in Sea Island cotton, however, and this variety has been practically eliminated as a factor in the market, having been largely displaced by Arizona cotton, Peruvian cotton, and Egyptian cotton.

EGYPTIAN COTTON

Spinners are still engaged moving the heavy accumulations of Egyptian cotton from Boston to spinning centers. Reports from New Bedford indicate that the threatened strike of mill workers for a fifty per cent wage increase may tie up the entire cotton spinning industry, as spinners are reported to have decided upon a stand-pat policy of closing down rather than giving in to the workers.

Reports from Egypt state that the old crop is practically all sold, all of the desirable grades having been sold for export. The new crop outlook is not very favorable. Although the acreage is larger than that of last year, sowing is late everywhere, and considerable re-sowing has been necessary, due to the fact that the Nile is much lower than had been anticipated.

AMERICAN-EGYPTIAN COTTON

The market continues to show strength. A report from Phoenix, Ariz., under date of April 29, says: "All previous high records for long staple cotton, used extensively in manufacturing of thread and of fabric for motor-car tires, were declared by local dealers to have been broken here when a cotton company announced it had bought thirty-three bales at $1.25 a pound." The prices paid in this sale displaced the previous records of $1.14 and $1.15 per pound. Spinners are in the market for practically unlimited quantities of this long staple cotton, but are unable to obtain supplies in sufficient quantities even though they are willing to pay high prices.

TIRE FABRICS

The market is at a standstill as far as new developments are concerned. There is no open market for tire fabrics, practically every yard produced going to tire manufacturers on contract deliveries. High prices on raw cotton, coupled with a threat of a general strike of workers in the spinning plants, are threatening a still firmer market on fabrics. Production is now below demand, and the effect of any prolonged strike in the spinning industry would be far reaching in the tire field.

HOSE AND BELTING FABRICS

A stronger market on ducks of all descriptions is believed in sight, due to advancing cotton costs, and manufacturers are already cutting down the discounts on their goods. Spot prices hold nominally unchanged on the basis of 78½ @ 82 cents per pound for both hose and belting ducks, 88 cents per pound for enameling duck, 90 @ 92 cents per pound for shoe ducks, 35 @ 38 cents per yard for single filling ducks, and 38½ @ 40 cents for double filling ducks.

DRILLS, SHEETINGS AND OSNABURGS

The market is showing a strong tone on spot goods, and prices are firmly maintained by first-hand sellers on the basis quoted below. Occasional sales by second hands are reported under the market, however. Drills and sheetings are meeting with a good demand from the rubber trade in general, and the market holds steady.

BURLAPS

Inactivity has ruled in the spot burlap for some time past and prices are more or less on a nominal basis. Stocks are coming forward from India in moderate quantities and are moving slowly into consuming channels. Reports from Calcutta state that manufacturers there are accepting orders for burlaps for delivery late in the year at appreciable price reductions from present market values.

TIRE FABRICS

17¼-ounce Sea Island, combed.	sq. yd.	Nominal
17½-ounce Egyptian, combed		2.35@2.50
17½-ounce Egyptian, carded		2.25@2.40
17½-ounce Peelers, carded		Nominal
17¼-ounce Peelers, combed		2.25@2.35

DUCKS

Belting (pound basis)	lb.	.78½ @	.82
Hose (pound basis)		.78½ @	.82
Enameling		.88 @	..
Shoe Ducks		.90 @	.92
Single filing	yd.	.35 @	.38
Double filing		.38½ @	.40

DRILLS

37-inch 2.35-yard	yd.	.32½ @	.33
37-inch 2.75-yard		.30 @	..
37-inch 3.00-yard		.29 @	..
37-inch 3.25-yard		.28 @	..
37-inch 3.50-yard		.26 @	.26½
37-inch 3.95-yard		.24½ @	..
37-inch 2.00-yard Southern		Nominal	
37-inch 2.00-yard Northern		Nominal	
40-inch 2.40-yard Southern		Nominal	
40-inch 2.40-yard Northern		Nominal	
52-inch 1.90-yard Southern		Nominal	
52-inch 1.90-yard Northern		Nominal	

SHEETINGS

40-inch 2.35-yard	yd.	.... @	....
40-inch 2.50 yard		.35 @	..
40-inch 2.85-yard		.32 @	.34
40-inch 3.00-yard		.... @	..
40-inch 3.25-yard		.... @	..
40-inch 3.75-yard		.28 @	.28½
40-inch 3.60-yard		.29 @	.30
40-inch 4.25-yard		.24 @	.25

***Note.*—In view of the unsettled conditions prevailing in the market at the present time, the prices quoted above are more or less nominal, and are not guaranteed.**

BURLAPS

(Carload lots)

			Cents Per Yard
7 -ounce	40-inch	.... @	....
7½-ounce	40-inch	9.90@	....
7½-ounce	45-inch	.... @	....
8 -ounce	40-inch	10.00@	....
8 -ounce	40-inch	10.00@	10.25
8½-ounce	40-inch	10.25@	....
10 -ounce	36-inch	.... @	....
10 -ounce	40-inch	14.00@	14.25
10 -ounce	45-inch	Nominal	
10½-ounce	40-inch	14.25@	14.50

BENZOL

The market has stiffened to some extent on benzol. Supplies are still very difficult to obtain, and spot holders have marked up their prices to 28 cents per gallon for 90 per cent, while pure is strong at 30 cents per gallon. Producers are still falling behind on their contract business, and it is thought that it will take them months to catch up again even when business becomes more normal.

LITHARGE

There is a steady tone ruling in the market, and prices are firmly maintained at the quoted basis. Business is somewhat backward due to the railroad strike, but producers are holding the market firm in anticipation of a more active market when spring buying by the paint trade begins. American powdered in casks firm at 11¾ @ 12¼ cents per pound.

LITHOPONE

Demand for lithopone practically doubles production, and the market is oversold to some extent. Transportation difficulties are hindering producers in their efforts to catch up with their business. They are bending every effort to speed up production, however, and deliveries will be heavier when the strike ends.

WHITING

Prices continue strongly held under continued short supplies. Imports of English chalk are somewhat larger. Commercial is steady at $1.40 per cwt., gilders' bolted at $1.55, and American Paris white at $1.75.

BARYTES

The market continues on a nominal basis, sales being made subject to price prevailing on date of shipment. Producers are unable to accept business for prompt shipment due to the railroad strike.

INTERMEDIATES

Aniline oil is quoted stronger at 38 to 40 cents per pound, and the undertone is still a bullish one. Dimethylaniline is still offering only in small quantities in second hands, and the market is quoted at $1.75 to $1.80 per pound. Benzidine is quotably unchanged at $1.30 per pound for base and $1.10 for sulphate.

MISCELLANEOUS

Turpentine has reached the record price of $2.65 per gallon, and stocks are to be had only in small quantities even at this high figure. The steamships are not bringing any up from the South as yet, concentrating on foodstuffs which had accumulated during the month's tie-up forced by the longshoremen's strike.

Increasing scarcity of dry colors is reported, and the market is quoted stronger on some lines, blacks, reds, blues, and greens having advanced somewhat.

Prices on glues have been advanced during the past fortnight, the advances being explained by the fact that animal waste products have advanced in price and forced the advance in glue prices.

Paraffine wax is somewhat stronger under light supplies; beeswax lower due to keen selling competition.

Chemicals and Compounding Materials

NEW YORK, May 6, 1920.

Production has been greatly delayed during the past few weeks by the continued congestion of the railroads. While the strike of switchmen and other workers is technically over, many of the men are still out on strike, and the movement of freight is still being greatly delayed. Embargoes are in force on many lines, while on others shipments are accepted subject to permission to ship from freight officials. This permission is not often forthcoming, however.

The effect of all this has been to stiffen prices for the general list of chemicals and raw materials, producers being forced to shut down due to lack of raw materials in many instances. The price advances brought on in this way, however, are thought to be only temporary, as conditions will not warrant the new high prices when the market gets back on a more natural basis.

Acetone, carlots	lb.	.21 @	.22
smaller lots	lb.	.22 @	.23
Acetanilid, C. P., bbls.	lb.	.70 @	.75
Acids, Acetic, 56%	cwt.	8.40 @	9.15
Carbolic, C. P.	lb.	.12 @	.20
Muriatic, 20 deg.	cwt.	2.25 @	2.50
Muriatic, 22 deg.	cwt.	3.00 @	3.25
Nitric, 42 deg.	cwt.	7.50 @	8.00
Nitric, 40 deg.	cwt.	7.00 @	7.25
Sulphuric, 60 deg. carlots	tons.	19.00 @	21.00
Sulphuric, 60 deg. carboys		— @	—
Tartaric, crystals	lb.	.78½ @	.79
Aluminum, Silicate		Nominal	
Aniline oil, bulk basis, Contract		— @	—
Imported		Nominal	
Domestic		.38 @	.40
Antimony—			
Oxide	lb.	.13½ @	.14
Sulphuret, red	lb.	.25 @	.30
Sulphuret, golden	lb.	.30 @	.35
Sulphuret, crimson	lb.	.45 @	.50
Alcohol, denatured, 190 proof		.98 @	1.02
Wood, 95%		2.65 @	2.70
Ethyl, 190 proof		Nominal	
Aldehyde Ammonia		Nominal	
Ammonia, powdered		.17 @	.17½
Ammonium Carbonate, domestic	lb.	.16 @	.16½
Amyl Acetate	gal.	4.10 @	4.25
Anthracene, 80%		.95 @	1.00
Anthroquinine, 95%		4.00 @	4.25
Asbestine		Nominal	
Asphaltum, Egyptian	lb.	.30 @	—
Domestic	ton	.30 @	.40
Barium, dust		— @	—
Sulphide	lb.	.07¼ @	.07½
Barytes, prime white imported	ton	Nominal	
white, domestic	ton	Not quoted	
off color, domestic	lb.	Not quoted	
Southern, f.o.b. mills		Not quoted	
Western, f.o.b. mills		Not quoted	
Beeswax		.30 @	.65
Benzidine Base	lb.	1.30 @	1.40
Benzol, 90%	gal.	.28 @	.30
Benzol, pure bulk, 100		.30 @	.35
Blanc Fixe, dry, bbls.	lb.	.05½ @	—
Benzidine Base	lb.	1.25 @	1.30
Benzol, 90%	gal.	.25 @	.28
Benzol, pure bulk, 100		.27 @	.30
Blanc Fixe, dry, bbls.	lb.	.05 @	—
Burgundy Pitch, dom.	lb.	.08 @	.10
Foreign		.60 @	.65
Blacks, Drop	lb.	.05½ @	.15
Ivory	lb.	.16 @	.30
Carbon, gas, cases	lb.	.15 @	.30
Lampblack R. M.	lb.	.15 @	.45
Mineral blacks	ton	35.00 @	45.00
Blues, Prussian		1.00 @	—
Soluble	lb.	1.00 @	—
Ultramarine	lb.	.15 @	.50
Browns, Umber, Turkey, burnt, powdered	lb.	.05½ @	.07
American, burnt	lb.	.04½ @	.06
Cadmium sulphide, yellow	lb	1.75 @	2.00
Carbon Disulphide, bulk	lb.	— @	—
Bisulphide	lb.	.07 @	.07½
Casein, C. P.	lb.	.35 @	.36
Castor Oil		.19 @	.22
Caustic Soda, 76%	cwt.	7.00 @	7.50
Chalk, precipitated, extra light	lb.	.05½ @	.06
heavy	lb.	.04½ @	.05
China clay, domestic	ton	8.50 @	20.00
imported	ton	18.00 @	23.50
China Wood Oil, bbls.	lb.	.24 @	—
F.o.b. Pacific Coast		.22½ @	.23
Chloroform, U. S. P.		.35 @	.36
Coal Tar Pitch		— @	—
Cottonseed Oil, crude, f.o.b. mills	lb.	15.25 @	15.50
Prime summer yellow, bbls.		18.50 @	—
Dimethylaniline	lb.	1.65 @	1.80
Elateron		— @	—
Formaldehyde, spot	lb.	.61 @	.63
Fullers Earth, powd., 100 lbs.		1.50 @	2.00
Fossil flour	lb	.03¾ @	.05
Genasco Mineral Rubber		— @	—
Gilsonite	ton	55.00 @	—
Glue, extra white	lb.	.35 @	.45
medium	lb.	.30 @	.35
low grade		.20 @	.25
foot stock		.16 @	.20
brown foots		.16 @	.20
common bone		.16 @	.20
Glycerine, C. P. (drums)	lb.	.24 @	.24½
cans		.25 @	.25½
Graphite, flake (bbl.)	lb.	.14 @	.25
powdered (bbl.)	lb.	.05 @	.10
Green, chrome, R. M.	lb.	.42 @	.71
Ground glass (fine)	lb.	.03½ @	.04
Hexamethylene	lb	Nominal	
Infusorial earth, powd'd.	lb.	.02 @	.035
bolted	lb.	.035 @	—
Iron oxide, red, reduced grades	lb.	.13 @	.15
red, pure, bright	lb.	— @	—
Hexamethyenetetramine	lb.	1.93 @	2.50
Kaolin		— @	—
Lime, hydrated		— @	—
Lead, red, dry (casks)	lb.	.12¼ @	.12½
sublimed	lb.	— @	—
white, basic carb.	lb.	.10½ @	.11
white, basic sulp.	lb.	.09¾ @	.10¼
Lime flour	lb.	.01¾ @	.02
Litharge (casks)	lb.	.11¾ @	.12¼
English	lb.	— @	—
Lithopone, domestic, bbls.	lb.	.08 @	.08¼
in bags	lb.	.07¾ @	—
M. R. X.		— @	—
Magnesia, carbonate	lb.	.17 @	.21
calcined light	lb.	.60 @	.65
Magnesite, calcined, pwd.	ton	50.00 @	65.00
Magnesia Oxide, heavy		— @	—
Light		— @	—
Extra light		— @	—
Napthalene	lb.	.16 @	.18
Nitrobenzol		.13½ @	.15
Naphtha, motor gasoline, (steel bbls.)	gal.	.28½ @	—
68 @ 70 degrees (steel bbls.)	gal.	.35½ @	—
70 @ 72 degrees (steel bbls.)	gal.	.36½ @	—
73 @ 76 degrees (steel bbls.)	gal.	.38½ @	—
machine (steel bbls.)	gal.	.47½ @	—
Oil corn, crude factory	cwt.	17.31 @	17.56
corn, ref. (bbls.)	cwt.	20.06 @	—
linseed (bbls.)		1.75 @	—
in carloads, spot		1.72 @	—
tank cars		1.67 @	—
Oil palm, Lagos	lb.	.15¼ @	—
Niger		.14 @	—
pine, yellow	gal.	1.00 @	—
distilled	gal.	1.25 @	1.55
rapeseed, refined	gal.	1.64 @	—
rapeseed, blown	gal.	1.64 @	—
rosin, first rectified	gal.	.90 @	—
second run		.93 @	—
tar (commercial)	gal.	.36 @	.38
Oleum Acid, 20%	ton	29.00 @	35.00
Orange mineral, Amer.	lb.	.15½ @	.16½
imported	lb.	— @	—
Ozokerite		.35 @	.36
Paraphenylenediamine	lb.	2.70 @	2.85
Petrolatum, bbls., amber.	lb.	.06 @	.07
pale yellow	lb.	.06½ @	.07
Paranitrosodimethylanaline		3.50 @	4.00
Paraffin, refined, 118@120 m. p.		.11¼ @	—
127@129 m. p.		.11 @	—
137@140 m. p.		.12½ @	—
Phenol		.12 @	.25
Pumis		.05 @	.10
Pine tar kiln	bbl.	14.50 @	—
Pitch	bbl.	8.50 @	—
Plaster of paris	bbl.	2.00 @	3.00
Red Tuscan	lb.	.22 @	.30
red (American)	lb.	.14 @	.16
Indian (English)	lb.	.14 @	.16
Standard	lb.	— @	—
Rosin (common to good)— 280 lbs.		19.50 @	—
Rotten stone, powdered	lb.	.02½ @	.04½
Rubber, substitute, black	lb.	.13 @	.17
white	lb.	.15 @	.24
brown	lb.	.20 @	.25
Rosin Oil, first rectified		.90 @	—
Second rectified		.93 @	—
Third rectified		1.11 @	—
Fourth rectified		1.15 @	—
Soda ash, light, 58%	cwt.	4.50 @	5.00
Sodium Nitrite	lb.	.24 @	—
Solvent Naptha, crude, hvy		.22 @	.27
Soya Bean Oil, bbls.	lb.	.17 @	.17½
Sellers tanks, f.o.b. Coast		.13¾ @	—
Stearic Acid, single		.25 @	—
Sulphur Chloride, drums		.06½ @	.16
Shellac, fine orange	lb.	— @	—
T. N.	lb.	1.20 @	1.25
Bleached ordinary	lb.	1.10 @	1.15
Bleached, bonedry	lb.	1.35 @	1.40
Silex (silica)	ton	25.00 @	40.00
Soapstone, powdered	ton	12.00 @	17.50
Starch, corn, powd.	cwt.	5.97 @	6.23
pearl		4.97 @	5.19
Jap, potato duty pd.	lb.	.09½ @	—
Sulphur, crude	ton.	— @	—
100 pounds		— @	—
roll		3.20 @	—
commercial superfine		2.00 @	2.25
Talc, American	ton	25.00 @	40.00
French	ton	— @	—
Thiocarbanilid		— @	—
Toluol, pure, in drums	gal.	.31 @	.35
commercial		.30 @	.32
Tripolite earth	lb.	.01½ @	—
Turpentine, pure gum— spirit	gal.	2.65 @	—
wood	gal.	— @	—
Venice, artificial	gal.	.15 @	.16
true		Nominal	
Vermilion, English	lb.	1.70 @	1.75
American		.25 @	.30
Vorite		Nominal	
Wax, beeswax, crude yel.	lb.	.29 @	.31
refined		.38 @	.40½
Bayberry		.38 @	.40
ceresin, white	lb.	.15 @	.16
yellow		.14 @	.15
Whiting, commercial	cwt.	1.40 @	—
Gilders Bolted		1.45 @	—
Paris white, Amer.	cwt.	1.75 @	—
English cliffstone	cwt.	2.00 @	—
Xylol (gal.), pure		.40 @	.45
Commercial		.35 @	.40
Zinc Oxide, French process, red seal		.11½ @	.11¾
green seal		.12½ @	.12¾
white seal		.13½ @	.13¾
Leaded Grades—			
Commercial, lead free		.09½ @	.10
5% lead sulphate		.09 @	.09½
10% lead sulphate		.08¾ @	.09¼
20% lead sulphate		.08½ @	.09
35% lead sulphate		.08¼ @	.09½
Zinc sulphate		.03½ @	.04¼

Crude Rubber

NEW YORK, May 5, 1920.

No improvement in the general market situation has been noted, and trading continues quiet with the market presenting a dull front. Leading factors in the market say that there is absolutely nothing going on at the present time. Consumers are well supplied with the heavy deliveries now going forward on contracts, and are not paying any attention to the spot market. Recent embargoes on the railroads have prevented manufacturers from getting enough raw materials to work on, the shortage of tire fabrics having been particularly acute in tire making plants. This shortage is not yet relieved, although manufacturers are working at capacity to keep up with their business.

	Cents per Pound.		
Para—Up-river fine	.42	@	—
Up-river medium	.40½	@	—
Up-river coarse	.31½	@	—
Caucho ball	.33	@	—
Islands fine	.42	@	—
Islands coarse	.22	@	—
Cameta	.21½	@	—
Ceylon—Smoked sheets, ribbed	.43½	@	—
Smoked sheets, plain	.42	@	.42½
Madeira, fine	.44	@	—
Knapsack	—	@	—
First latex pale crepe	.43½	@	.44½
Amber crepe	Nominal		
Clean brown crepe	—	@	—
Rio Nunez string	.55	@	—
Palembang	.13	@	—
African	.33	@	—
Prime Surinam sheets	.84	@	—
Centrals—Corinto prime	.32	@	.32½
Esmeralda, prime	.32	@	.32½
*Balata, sheets	—	@	—
Guayule, wet	.27	@	—
Balata, block, Panama	.57	@	—

* Nominal.

Scrap Rubber

NEW YORK, May 5, 1920.

Rubber reclaimers and moulders are not in the market for scrap rubber in any quantities, and the market continues to show a quiet appearance, with prices nominal on most lines. While conditions remain as they are at present, accurate quotations are impossible, but those given below give a fair idea of present market values, although selling prices now are largely determined by conditions peculiar to each sale.

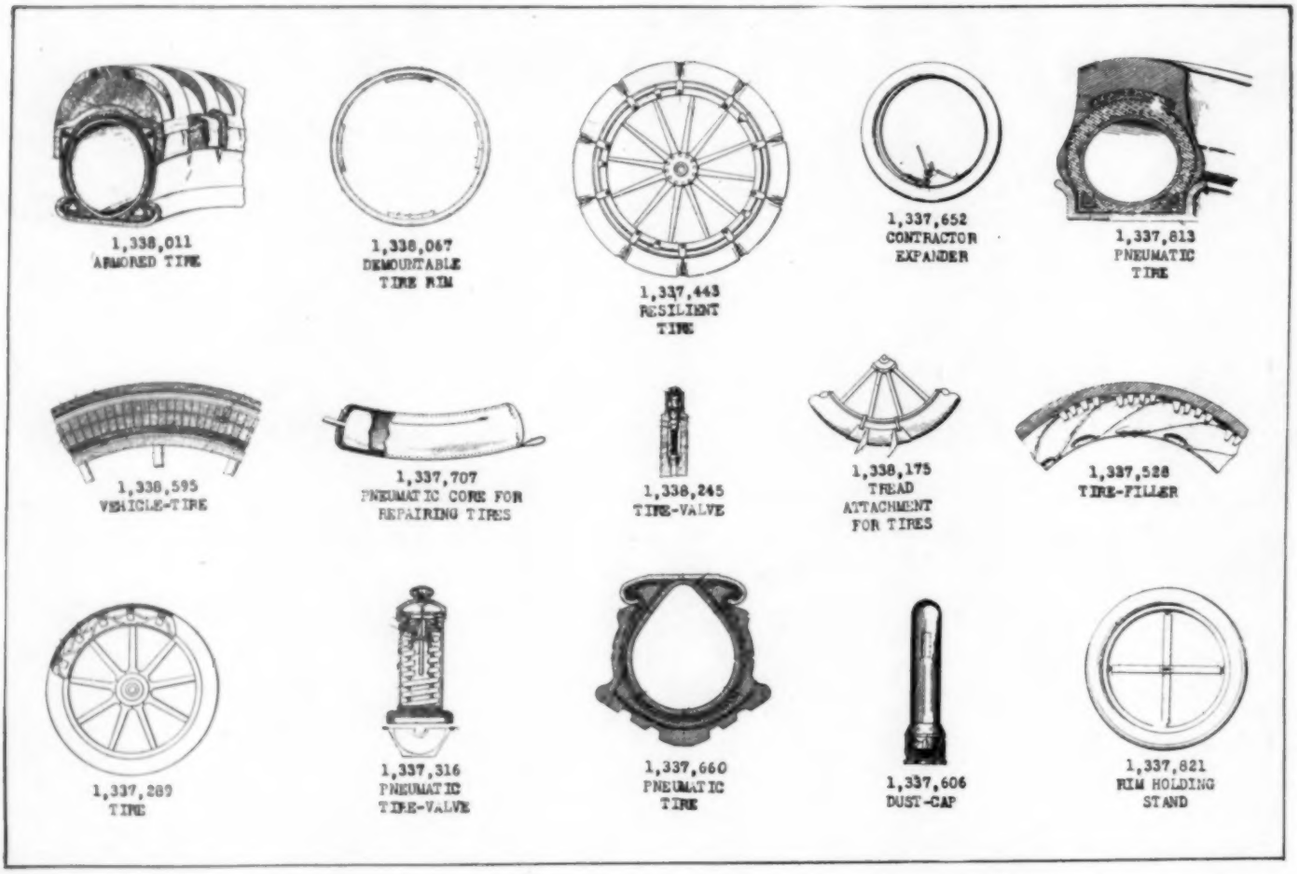
Selling pressure on supplies of old boots and shoes continues marked and dealers are still over supplied on these goods. The low market for crude rubber is having the effect of keeping the demand for the reclaimed stock dull. It is not thought that reclaimers are carrying heavy stocks, and a firmer market is looked for when they again enter the buying field.

	Cents per Pound.		
Boots and shoes	7.50	@	7.75
Arctics, trimmed	5.75	@	6.00
Arctics, untrimmed	5.00	@	....
Tires—Automobile	3.25	@	3.50
Bicycles, pneumatic	2.50	@	3.00
Mixed hose	1.50	@	1.75
Air brake	....	@	....
Inner tubes, No. 1	15.00	@	18.00
Inner tubes, No. 2	9.00	@	10.00
Red tubes	8.12½	@	9.00

American Rubber Patents

ISSUED APRIL 20, 1920.

1,337,289—To John Gordon Summers, San Diego, Cal. Tire.
1,337,316—To John O. Helliwell, Pasadena, Cal. Pneumatic tire valve.
1,337,443—To Demetreos J. Demas, Pittsburgh, Pa. Resilient tire.
1,337,446—To Michael A. Endres and Lawrence M. Endres, Cross Plains, Wis. Sectional wheel rim.
1,337,528—To James H. North, Blackwood, N. J. Tire filler.
1,337,606—To Alvah L. Just, Syracuse, N. Y. Dust cap.
1,337,652—To Albert C. Hoecker, Collinsville, Ill. Contractor expander.
1,337,660—To Edward Brice Killen, London, England. Pneumatic tire.



1,337,707—To Alvin L. Johnson and Alfred O. Alsten, Worcester, Mass. Pneumatic core for use in repairing tires.
1,337,813—To Eric P. Altenburg, Columbiana, Ohio. Pneumatic tire.
1,337,821—To Patrick Cannon, New York, N. Y. Rim-holding stand.
1,337,950—To Louis F. Petey, Rhinelander, Wis. Tire protector.
1,337,962—To Hugh G. Robinson, Philadelphia, Pa. Resilient heel-plate for shoes.

Many Apply for Brazilian Goodyear

H. L. Matti, general foreman of the Flying Squadron of the Goodyear Tire & Rubber Company, Akron, Ohio, has received more than 125 applications from the squadron for assignment to the new plant to be built in Brazil. It is planned to send fifty men from the production squadron and ten from the engineering squadron, there being twice as many applications in each case as can be accepted.

The squadron men are scheduled to go to South America about the first of the year 1921 and the intervening period will be spent by the sixty men selected for the Rio plant, in intensive study of departmental work.

Firestone Fights High Costs

In behalf of its employes, the Firestone Tire & Rubber Company, Akron, Ohio, is planning a new attack on the high cost of living. As a first step, George Dietz, formerly buyer for commissaries and cafeteria manager for the U. S. Emergency Fleet Corporation, has been brought to Akron to take a similar position with the company. He will have direct charge of the Clubhouse, cafeterias, and Clubhouse Store.

Firestone has scoured the country for the best man to handle this work, and believes the right man has been found in Mr. Dietz.

He began his business career as a clerk in his father's grocery at Cleveland, going on the road six years later as salesman for the largest importing house in New York City.

He thus became familiar with every kind and grade of food commodities. After a splendid practical experience along this line, he associated himself, as general manager and buyer, with the General Stores Company and the E. S. Knox Corporation chain of grocery stores in Detroit, with branches located in many cities.

When the war came on, he was asked to contribute the benefit of his experience to the Shipping Board, in solving the many knotty problems connected with its commissaries and cafeteria system.

It will thus be seen that Mr. Dietz has been associated with this work for a long time in a big way; indeed, his record of achievement in this line is second to none in the country. His wide experience and contact with direct sources of supply should count heavily in the result obtained here.

Under his management it is expected that the company's policy of buying in large quantities will be greatly extended, so that employes will have the benefit of even lower prices at the Clubhouse Store than heretofore. Weekly "specials" at cost will be strongly featured.

As manager of the Clubhouse and director of cafeterias, Mr. Dietz is expected to make innovations from which Firestone employes will profit in a practical way. Improvements and alterations in the lay out and system of the cafeterias are already under way. These changes will speed up service materially.

At the Ecorse ship building yards, near Detroit, he designed and supervised a cafeteria which during the war served as many as 3,000 persons at one time. Under the system which he perfected, each person was served within ten minutes after entering the building. Only thirty-six girls were required at the serving tables. This cafeteria became the model for numerous factory dining halls.

It is the ambition of the new manager to make the Clubhouse the most popular place in Akron—the headquarters of good fellowship and healthful recreation. Under his direction the general plan of social activities will be worked out so as to reach the needs of Firestone people in a more intimate way than heretofore.

Goodall New York Office Moved

Announcement has been made by the Goodall Rubber Co., Inc., to the effect that on and after May 1 the firm's New York office and warerooms will be located at 38 Vesey street. The new quarters permit the carrying of three times as much stock as heretofore which will consequently result in even better service than has been given in the past.